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THE CONTROL OF DUST-BORNE STREPTOCOCCAL INFECTION IN MEASLES WARDS

BY

JOYCE WRIGHT, D.M. ROBERT CRUICKSHANK, M.D., M.R.C.P., D.P.H.

AND

WILLIAM GUNN, M.B., Ch.B., F.R.C.P., D.P.H.

(From the L.C.C. North-Western Hospital and Group Laboratory, Hampstead)

Hospital trials on the control of dust-borne infection by oiling blankets, ward linen, garments, and floors were carried out in scarlet fever and measles wards in this hospital during the spring of 1942 and of 1943. The work in a scarlet fever ward, while on the whole encouraging, awaits the result of further tests before being recorded. The results of a controlled test in two measles wards are now reported.

The haemolytic streptococcus has for many years been recognized as a predominant secondary invader in measles and as an important cause of its serious complications—e.g., otitis media, mastoiditis, and bronchopneumonia. The virus-damaged mucous membrane of the respiratory tract, the catarrhal nature of the primary infection, and the overcrowding of patients in hospital at epidemic times all combine to favour the acquisition and spread of streptococci. The incidence of otitis media among measles patients may be as high as 20% (Allison and Brown, 1936); and of the patients so affected as many as 30% may develop mastoiditis. The frequency and severity of its complications made measles an important infection among the camp diseases of the United States Army during 1917 and 1918 (Michie and Lull, 1928). Its most serious consequences were pneumonia, empyema, and otitis media, which in the majority of cases were due to haemolytic streptococci. Cole and MacCallum (1918) found that a haemolytic streptococcal throat-carrier rate of 11.4% among measles patients on admission to hospital had risen to 38.6% after 3 to 5 days in the wards and to 56.8% after 8 to 16 days. They concluded that the chance of developing post-measles streptococcal infection was increased by residence in hospital, and that the high incidence of pneumonia, and the resulting high mortality, were due in part to infection occurring within the hospital. The sequence of events has become clearer since Griffith (1934) extended his method for the serological typing of *Str. pyogenes*. Allison and Brown (1936) were thus enabled to make a survey in a measles ward. They took nose and throat swabs from 43 patients once weekly from admission to discharge, and appropriate swabs on the occurrence of any complication. By typing the strains of *Str. pyogenes* which they had isolated they showed that cross-infection with these organisms occurred in 22—i.e., 51.2%—of the 43 patients; and that of the patients thus cross-infected 13 developed complications as a result (7 otitis media; 1 scarlet fever with otitis media; 1 rhinitis; 4 rise of temperature only). In other words, 19% of the measles patients developed otitis media consequent upon cross-infection with streptococci.

The work of Brown and Allison (1937) and of Cruickshank and Godber (1939) suggested that dust may be an important vehicle of haemolytic streptococci among patients with upper respiratory tract infections. These investigations revealed an increase in the number of streptococci in the ward air during bed-making and sweeping activities. Later, Thomas and van den Ende (1941) observed that in a ward containing tonsillitis cases both floor-sweepings and bed-clothes were heavily contaminated with haemolytic streptococci. Van den Ende, Thomas, and colleagues (van den Ende, Lush, and Edward, 1940; Thomas, 1941; Thomas and van den Ende, 1941; van den Ende, Edward, and Lush, 1941; van den Ende and Spooner, 1941; van den Ende and Thomas, 1941) investigated possible measures for the control of dust-borne infection in wards. The dust-laying effect of spindle oil when applied to floors was tested in field trials by Thomas, who found that the method produced a prolonged and marked reduction in the number of bacteria in the air during sweeping. Since, however, the main source of the bacteria-carrying particles lay in the bed-clothes, van den Ende and co-workers devised methods for the treatment of woollen and cotton materials with technical white oil, which reduced by 99% the number of micro-organisms liberated during bed-making. The method of oiling ward articles by the use of oil-in-water emulsions (van den Ende and Thomas, 1941) during the laundering process has been modified and made more practicable for large-scale application by Harwood, Powney, and Edwards (1944) of the British Launderers' Research Association. These workers describe their technique in an article at page 615 of this issue.

Scope of the Investigation

The purpose of this work was to find out if, in a measles ward, the oil treatment of floors, bed-clothes, linen, etc., would reduce: (1) the number of haemolytic streptococci in the air during sweeping and bed-making, (2) the incidence of cross-infection by haemolytic streptococci, (3) the incidence of clinical complications due to such cross-infection.

The work was undertaken for 12 consecutive weeks during March, April, and May, 1943, in two measles wards, identical in size, design, and aspect. In one—the Control Ward—no measures were taken against dust-borne infection. In the other—the Test Ward—the following measures were taken: during the first three weeks the floor was treated with spindle oil; during the subsequent nine weeks the floor was re-oiled every four weeks, and all blankets, counterpanes, sheets, pillow-slips, patients' garments, towels, gowns, white coats, curtains, etc., were treated with technical white oil during laundering. The blankets of each patient were disinfected after his discharge or transfer from the ward, and were washed and re-oiled every four weeks. The articles were oiled at the Laboratories of the British Launderers' Research Association. The bacterial content of the air, and the cross-infection and complication rate due to haemolytic streptococci, were studied in both wards throughout the investigation.

Ward Arrangements

1. The normal bed complement was 18 for each ward, and the normal spacing was 12 feet between bed-centres. During ten weeks of the investigation two extra beds, and during two weeks four extra beds, were put up in each ward, and the bed-spacing was correspondingly reduced.

2. So far as was practicable, patients were admitted alternately to the two wards.

3. Sulphonamides were given prophylactically to all patients unless there was any contraindication. During the first three weeks of the work a number of different drugs were used, in varying doses and for varying times. An intensive scheme was then introduced, and alternate patients admitted to each ward received sulphanilamide or sulphathiazole. The dosage, according to age, was 1 to 2 g. on admission, 3 to 7.5 g. daily for 3 days, followed by 1.25 to 3.75 g. daily till the day before discharge.

4. On admission prophylactic mixed scarlet fever and diphtheria antitoxin was injected into 54 (70.1%) of the 77 patients in the *Control Ward*, and into 56 (55.4%) of the 101 patients in the *Test Ward*.

5. Toys from both wards were periodically disinfected by heat. (During the later part of the work each patient in the *Test Ward* was allotted one toy, which was disinfected when he left. Had this plan of toy control been noticed earlier a similar method would have been adopted in the *Control Ward* also.)

6. Mattress, pillows, and blankets of each patient were disinfected in the hospital steam disinfector (5-lb. pressure for 30 minutes) on his discharge or transfer from the wards.

7. Patients with suppurative otitis media, if retained in the wards, were barrier-nursed. Feeding and sanitary utensils used by these patients were disinfected after use.

Routine Procedure

Air Sampling.—The bacterial content of the ward air was investigated by means of a slit sampler (Bourdillon, Lidwell, and Thomas, 1941). At intervals of 7 to 14 days air samples were taken in each ward during the early morning bed-making and sweeping times. The machine, on a trolley, was moved from one bed to the next as each in turn was made. During sweeping the machine remained at a central position in the ward. The height of the slit, through which air was drawn at the rate of one cubic foot a minute, was four feet from the floor. For measuring the total bacterial content of the ward air blood-agar plates were exposed in the slit sampler for one to three minutes, and were incubated aerobically for 24 hours at 37° C. The number of bacterial colonies (and, if not overgrown, the number of haemolytic streptococcus colonies) was counted on each plate. On crowded plates only an approximate count could be made. The total volume of air sampled for total bacteria was 8 cu. ft. on each occasion during bed-making or sweeping. For measuring the haemolytic streptococcus content of the air gentian-violet blood-agar plates were exposed in the slit sampler for 5 to 15 minutes. The number of haemolytic streptococcus colonies on each plate was counted after 24 hours' incubation at 37° C. aerobically, and representative colonial forms were transferred to blood broth for subsequent serological typing by the slide-agglutination method of Griffith. The total volume of air sampled on each occasion for haemolytic streptococci was 50 cu. ft. during bed-making and 30 cu. ft. during sweeping.

Cross-infection Incidence.—At the start of the investigation nose and throat swabs were taken from all patients in both wards. Subsequently, swabs were obtained from the nose and throat and from any suppurative lesion—e.g., ear discharge, impetigo—of every new patient, immediately *before* admission to the wards and then once weekly. Nose and throat swabs were taken from each member of the ward staff once monthly, and also on the development of any upper respiratory tract infection. Swabs were plated on gentian-violet blood-agar plates and incubated aerobically for 18 hours at 37° C. Representative colonial forms of haemolytic streptococci were tested for their serological type. Cross-infection was judged to have occurred if a patient, free from haemolytic streptococci on admission, acquired these organisms in the nose or throat; or if a patient who carried haemolytic streptococci on admission acquired haemolytic streptococci of different type in the nose or throat. In assessing the cross-infection rate the Type 6 streptococcus was adopted as the "indicator organism," since more than 90% of the cross-infections in both wards were due to this type. For completeness, however, all cross-infections with other serological types are recorded.

Complication Rate.—A daily round of all the patients in both wards was made and any complication or rise of temperature noted. Appropriate swabs were taken and plated on blood agar, and/or gentian-violet blood agar, and/or tellurite medium, according to the nature of the complication. Ear and mastoid swabs were investigated for the presence of haemolytic streptococci, pneumococci, staphylococci, and diphtheria bacilli. Any haemolytic streptococci isolated from patients with complications were tested for serological type.

Results of Investigation: Preliminary Period

During a preliminary period of three weeks the routine investigations were carried out in both wards. The only difference in dust control between the two wards during this time was that the floor of the *Control Ward* was unoiled, while that of the *Test Ward* was oiled.

Air Sampling.—Air samples were taken once weekly in each ward during the bed-making round. In the *Control Ward* the samples yielded respectively 103, 265, and 349 haemolytic streptococcus colonies per 50 cu. ft. of air. The high count of 349 on one occasion was largely due to one sample of 10 cu. ft. which yielded 177 colonies. All of 15 colonies tested serologically were Type 6. In the *Test Ward* the samples yielded respectively 149, 117, and 98 haemolytic streptococcus colonies per 50 cu. ft. of air. Thirteen of 14 colonies tested serologically were Type 6.

Cross-infection Rate.—At the start of the investigation 8 (36.4%) of the 22 patients in the *Control Ward* had Type 6 streptococci in the nose and/or throat; in addition one patient had Type 2 and one had Type 27 streptococci. During the preliminary period 16 (53.3%) of the 30 patients at risk (i.e., Type-6-negative either at the start of the period or on admission) acquired Type 6 streptococci in the nose and/or throat. In addition two other patients acquired Type 2 and Group C streptococci respectively. Seven (38.9%) of the 18 patients already in the *Test Ward* had Type 6 streptococci in the nose and/or throat; in addition one patient had Type "Impetigo 19," and one had Type 12 streptococci. During the preliminary period 18 (58.1%) of the 31 patients at risk acquired Type 6 streptococci in the nose and/or throat. In addition two patients acquired "type not determined" and Type 14 streptococci respectively.

Complication Rate.—During the preliminary period 7 patients out of 38 at risk in each ward developed middle-ear suppuration due to cross-infection with Type 6 streptococci. The ear-complication rate due to cross-infection was therefore 18.4% in each ward.

These results disclosed that conditions in the two wards were remarkably similar during the preliminary period. In both between 36 and 39% of the patients were harbouring the Type 6 streptococcus at the start of the work; in both the cross-infection rate with this type lay between 53 and 59%; in both the middle-ear complication rate, due to Type 6 streptococcus, was 18.4%; and in both numerous Type 6 streptococci were present in the ward air during bed-making.

Test Period

During the subsequent nine weeks the same investigations were continued in both wards. In the *Control Ward* no steps were taken during this period against dust-borne infection, whereas in the *Test Ward* the full measures of dust control—i.e., oiled floors, oiled bed-clothes, oiled garments, etc.—were maintained throughout. The change-over to oiled bed-clothes and other articles was accomplished in one day, and the floor was re-oiled on the same day.

Air Sampling.—Table I shows the results of air sampling at bed-making times in the two wards during the test period.

TABLE I.—*Counts of Total Bacteria and of Haemolytic Streptococci in Air during Bed-making in Control and Test Wards*

Ward	Date	Total Bacterial Colonies (approx.) developing per 8 cu. ft. of Air	Haemolytic Streptococcal Colonies developing per 50 cu. ft. of Air
Control	3/4/43	14,610	147
	15/4/43	15,540	131
	1/5/43	12,580	97
	13/5/43	5,240	218
	20/5/43	7,580	39
Test ..	26/3/43	1,120	7
	2/4/43	1,780	10
	9/4/43	1,013	2
	17/4/43	685	2
	30/4/43	1,845	0
	14/5/43	445	0
	22/5/43	390	0

Table II shows the results of air sampling at sweeping times in the two wards during the test period. Forty-eight colonies of haemolytic streptococci isolated from the air in the *Control Ward* were tested serologically; of these, 37 were Type 6. Eight colonies from the air of the *Test Ward* were typed, and all were Type 6. The reduction in the bacterial counts of the air in the *Control Ward* towards the end of the experiment may have been due to two factors: (*a*) the improved weather and longer days, which allowed better natural ventilation; and (*b*) the reduction in the number of patients in the *Control Ward*, which during the last two weeks had a varying daily complement of 7 to 13, compared with 12 to 17 in the *Test Ward*.

TABLE II.—*Counts of Total Bacteria and of Haemolytic Streptococci During Sweeping in Control and Test Wards*

Ward	Date	Total Bacterial Colonies (approx.) developing per 8 cu. ft. of Air	Haemolytic Streptococcal Colonies developing per 30 cu. ft. of Air
Control	3/4/43	4,093	37
	15/4/43	15,260	34
	1/5/43	2,100	52
	13/5/43	1,500	9
	20/5/43	846	10
Test ..	2/4/43	226	1
	17/4/43	250	0
	30/4/43	810	0
	17/5/43	355	0
	22/5/43	315	0

Cross-infection Rate.—During the test period 30 (73.3%) of the 41 patients at risk in the *Control Ward* acquired Type 6 streptococci in the nose and/or throat. The infections were distributed regularly throughout the period. Cross-infection with other streptococcal types did not occur. During the test period 11 (18.6%) of the 59 patients at risk in the *Test Ward* acquired Type 6 streptococci in the nose and/or throat. In addition three other patients acquired Group A "type not determined," Group C, and Type "B 3264" streptococci respectively. The ward was never free from a source of the Type 6 streptococcus, the number of patients harbouring this organism at any one time varying from a maximum of nine to a minimum of one. The time during which there was only one source present was eight days. The Type 6 cross-infections were distributed as follows: 2 in the last week of March, 2 in April, and 6 in May

Complication Rate.—During the test period 7 (14.3%) of the 49 patients at risk in the *Control Ward* developed middle-ear suppuration due to Type 6 streptococcus. During the same period 2 (2.8%) of the 72 patients at risk in the *Test Ward* developed middle-ear suppuration due to Type 6 streptococcus. The other cross-infecting strains caused no complications.

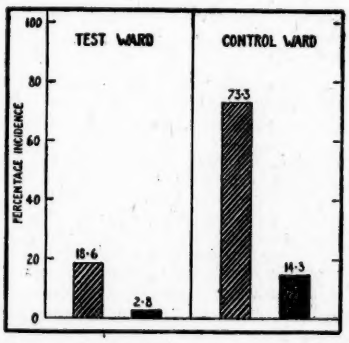

Chart showing cross-infection rate (cross-hatching) and middle-ear infection rate (black columns) due to Type 6 streptococci in (*a*) *Test Ward* with oiled bed-clothes, garments, and floor; (*b*) in *Control Ward* with no anti-dust measures.

Sources and Spread of Haemolytic Streptococci

Patients.—The Type 6 "indicator" streptococcus was well established at the beginning of the investigation. It was not possible to trace its origin, but its presence in both wards may have been due to the transfer of patients from one ward to the other a few weeks before this investigation began. Haemolytic streptococci of various other types were brought into both wards in the noses and throats of newly admitted patients. The carrier rate among new patients to the *Control Ward* was 18.2%, and to the *Test Ward* 12.2%. The type distribution, taking the two wards together, was: Group A, "type not determined," 4; Type 27, 4; Type 11, 2; Types 4/24, 6, 12, 13, 22, 28, "Impetigo 19," one each; Groups C and G, one each. One patient was admitted to the *Control Ward* and two patients to the *Test Ward* with streptococcal otorrhoea. Two of these (one with Type 1 and one with Type 6) were removed from the wards after a few days. The third (Type 22) was nursed in the *Test Ward*. There was no evidence that strains of streptococci in the upper respiratory tracts of new patients spread to other patients in the wards during the period of investigation.

Convalescent patients may become cross-infected after they are allowed up. Thus 5 of the 11 cross-infections in the *Test Ward* were first discovered in the swabs taken on the morning of the patients' discharge from hospital. Apparently they acquired the infection during convalescence by "visiting" infected patients in the ward.

Ward Staff.—Haemolytic streptococci were isolated from five members of the staff in the *Control Ward* at the routine swabbing. The type distribution was: Group A, "type not determined," 3; Type 6, 2. The two nurses with Type 6 streptococci developed sore throats. Haemolytic streptococci were isolated from four members of the *Test Ward* staff, with the following distribution: Type 6, 2; Types 12 and 25, one each. From time to time fingers of the ward staffs were swabbed, and it was not uncommon to find haemolytic streptococci upon them.

Ward Articles, Toys, etc.—Haemolytic streptococci, often in large numbers, were grown from toys, magazines, baths, tablecloths, bibs, spoons, tables, floors, etc., in both wards.

Nasal Toilet.—This was performed with cotton-wool rolled at the bedside on to wooden applicators. Petroleum jelly from a common pot was spread on the lips and face with the fingers. Numerous haemolytic streptococci were found in the petroleum jelly, and, as already mentioned, these organisms were also found on the nurses' fingers.

Chemoprophylaxis and Sulphonamide Resistance

Streptococcal cross-infections and their resulting complications occurred in spite of the fact that prophylactic sulphonamides were given to the majority of the patients in both wards. Of the Type 6 cross-infections, 37 of the 46 (80.4%) in the *Control Ward* and 20 of the 29 (69%) in the *Test Ward* were contracted while the patients concerned were receiving these drugs. A possible explanation of the ineffectiveness of chemoprophylaxis in preventing the spread of Type 6 streptococci lay in the fact that these strains in both wards were, as shown by *in vitro* tests, sulphonamide-resistant.

Complications resulting from Cross-infection

All cases of otorrhoea and of mastoiditis which developed after admission in both wards were the result of Type 6 streptococcus cross-infection. Table III shows that other complications due to cross-infection by this type also occurred. It lists these together with the middle-ear complications. In

TABLE III.—*Nature and Distribution of Type 6 Streptococcus Complications in Control and Test Wards*

Ward	Nature of Complication	No. of Cases	
		Preliminary Period	Test Period
Control	S.O.M., unilateral or bilateral	6	4
	R.S.O.M., B. mastoidectomy and gastro-enteritis	—	1
	L.S.O.M. and L. mastoidectomy	—	1
	L. mastoidectomy and extradural abscess of middle fossa	1	—
	B. mastoidectomy	—	1
	Skin sepsis	3	1
	Conjunctivitis	1	—
	Sore throat	—	1
	Purulent rhinitis	—	1
	Rise of temperature only	1	—
Test	S.O.M., unilateral or bilateral	4	2
	R.S.O.M. and R. mastoidectomy	2	—
	R.S.O.M. and orbital cellulitis	1	—
	Ulcerated lip	—	1
	Scarlet fever	—	1
	Rise of temperature only	2	2

R. = Right. L. = Left. B. = Bilateral. S.O.M. = Suppurative otitis media.

the *Test Ward* five children developed dermatitis or erythema of the skin. The reactions, which were mild and quickly subsided, may have been caused by the oil-treated undergarments, since evidence of skin irritation was also observed among scarlet fever patients after wearing similarly oiled garments. This problem is being further investigated.

Discussion

The results demonstrated that most of the serious complications in the measles wards were due to haemolytic streptococcal cross-infection. At the start of the work there was a heavy load of streptococcal infection in both wards. Toys, books, baths, and other ward articles yielded these organisms in abundance; and more than a third of the patients harboured Type 6 streptococci in the upper respiratory tract. We found also in the preliminary period that this type spread to more than half of the new patients, and caused one in every five to develop suppuration of the middle ear.

For a number of reasons we chose to control dust-borne infection rather than that carried by other means. Haemolytic streptococci multiply, almost as if in artificial culture, on the susceptible mucous membranes of measles patients. The catarrhal character of the disease favours gross contamination of bed-clothes and garments, from which on movement infected dust particles are released into the air. The streptococci are then free to infect fresh patients or to reinfect those already affected. They also contaminate the ward dust, and rise into the air again during sweeping and dusting. Air samples showed that during bed-making the air was heavily charged with haemolytic streptococci and, to a less extent, during sweeping. In the busy measles wards there was a constant stir and therefore a steady contamination of the air. Contact and droplet infection could not be disregarded, but they appeared to be occasional risks only, compared with the day-and-night inhalation of infected dust particles.

A further reason for our attempt to control dust-borne infection was the fact that there were means available of reducing and, possibly, of eliminating it. The first method which we tried was the treatment of the *Test Ward* floor with spindle oil, but we quickly discovered that this by itself was not enough. During a three-weeks trial of this method the air during bed-making contained 100 to 150 haemolytic streptococci per 50 cu. ft., the cross-infection rate (58.3%) was rather higher in the *Test* than in the *Control Ward*, and the ear-complication rate of 18.4% was the same in both wards. These findings are not surprising if the paths of dust-borne infection are considered: upper respiratory tract → droplets and discharges → bed-clothes and garments → ward air during bed-making → ward dust → ward air during sweeping. Thus the application of dust-laying oil to floors breaks only the last link in the chain; it does not influence the first and main reservoir of infected dust particles—the bed-clothes and garments of infected patients. Our second method of attack, therefore, was directed at this earlier link in the chain. The marked reduction in the number of aerial streptococci and in cross-infection and complication rates which followed the oiling of all blankets, ward-linen, and garments has been recorded above. It was, of course, possible that a spontaneous waning of the streptococcal cross-infection in the *Test Ward* had coincided with the introduction of the full anti-dust measures, but it seemed unlikely, for a reservoir of the cross-infecting Type 6 streptococcus never failed in the *Test Ward*, and new patients were admitted at the rate of about one a day. Their susceptibility was shown by the fact that a high cross-infection rate with the same streptococcus prevailed in the *Control Ward* among new patients, drawn from the same population during the same period.

Although the cross-infection rate was greatly reduced in the *Test Ward* after the introduction of oiled bed-clothes and garments, the residual incidence of 18.6% was still too high to allow of complacency. For the further prevention of secondary streptococcal infection in a measles ward measures may be required against mediate infection by fingers, toys, petroleum jelly, etc., and against direct droplet spread by staff carriers or between new and convalescent patients. On the other hand, it seems reasonable to assume that a heavy load of streptococcal infection would have been averted had anti-dust measures been introduced at the opening of the ward, so that these precautions might by themselves have sufficed to prevent clinical complications.

Thus our results suggest that cross-infection in measles wards is mainly due to dust-borne streptococci, which can be controlled by the oiling of floors, bed-clothes, and garments, but not by the oiling of floors alone. However, experience of these new methods of dust control is as yet not sufficient to justify any final judgment on their efficacy, and they should not be pressed into routine service until their advantages and limitations are more fully explored. There seems good reason to believe that they would prove useful in controlling secondary bacterial infection among influenza patients who may have to be nursed in large open wards. Anti-dust measures might also be tried in institutions—e.g., residential schools and training establishments—where respiratory infections are apt to spread.

Summary

An investigation into the control of dust-borne haemolytic streptococci was carried out in two measles wards of identical design during the spring of 1943. In the *Test Ward*, during a three-weeks preliminary period, the floor alone was oiled. During a subsequent nine-weeks period bed-clothes, patients' garments, and all other woollen and cotton articles in ward use were treated regularly with emulsions of technical white oil, and the floor was re-oiled at intervals. In the *Control Ward* no anti-dust measures were taken. In both wards the air was sampled for total bacteria and for haemolytic streptococci during bed-making and sweeping, and the streptococcal cross-infection and complication rates were recorded and analysed. In assessing the cross-infection rate Type 6 streptococcus was adopted as the "indicator organism," since in the two wards it accounted for 90% of the cross-infections and for all the middle-ear complications occurring after admission.

In the *Test Ward*, while the floor alone was oiled the Type 6 cross-infection rate was 58.1%, compared with a rate of 53.3% in the *Control Ward*. In each ward the middle-ear complication rate due to Type 6 was 18.4%. Haemolytic streptococci were numerous in the air of both wards during bed-making, the predominant strain being Type 6. Thus oiling of floors alone was not sufficient to control the spread of dust-borne haemolytic streptococci in measles wards.

In the *Test Ward*, while the full anti-dust measures of oiled bed-clothes, garments, etc., and oiled floor were in force: (*a*) the mean haemolytic streptococcus count in the air during bed-making was reduced by 97.5%; (*b*) the mean bacterial count in the air during bed-making was 91% less, and the mean haemolytic streptococcus count 98% less, than in the *Control Ward*; (*c*) the mean bacterial count in the air during sweeping was 92% less, and the mean haemolytic streptococcus count 99% less, than in the *Control Ward*; (*d*) the Type 6 cross-infection rate was 18.6%, while in the *Control Ward* it rose to 73.3%; (*e*) the middle-ear complication rate due to Type 6 was 2.8%, compared with 14.3% in the *Control Ward*. Thus the oiling of all bed-clothes and ward-linen, in addition to the oiling of floors, effectively controlled dust-borne streptococcal infection in measles wards. Cross-infection from direct contact or mediate means was not prevented by anti-dust measures.

A high streptococcal infection rate occurred in spite of intensive sulphonamide prophylaxis. The cross-infecting Type 6 strain was found by *in vitro* tests to be sulphonamide-resistant.

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A NEW TECHNIQUE FOR THE APPLICATION OF DUST-LAYING OILS TO HOSPITAL BED-CLOTHES

BY

F. COURTNEY HARWOOD, B.Sc.

J. POWNEY, Ph.D., B.Sc.

AND

C. W. EDWARDS, B.Sc.

(From the British Launderers' Research Association Laboratories, Hill View Gardens, Hendon, N.W.4)

The treatment of bed-clothes with dust-laying oils for the purpose of reducing dust-borne infection in hospital wards has recently been investigated in some detail (van den Ende, Edward, and Lush, 1941); van den Ende and Thomas, 1941; Thomas and van den Ende, 1941). It was found that the application of from 3 to 7% of liquid paraffin or of technical white oil to bed-clothes caused a very large reduction of dust-borne bacteria in the air of hospital wards. Two distinct methods of applying the oil to bed-clothes were studied by these authors: (*a*) impregnation with oil dissolved in a volatile organic solvent; (*b*) impregnation with concentrated oil-in-water emulsions.

Neither of these processes permits accurate control of quantities, while, from an economic point of view, both methods entail a recovery process for the unused oil, and would present considerable difficulty in large-scale operation in a hospital laundry. Early in 1942 Dr. van den Ende, of the National Institute for Medical Research, invited the co-operation of the British Launderers' Research Association with regard to this difficulty, and an investigation was carried out in these laboratories in which the use of dilute aqueous emulsions for oiling was considered in detail. As a result of this work an efficient and economic process has been evolved and applied on a large scale. It is the purpose of this paper to present the theoretical considerations and practical details of the process.

Experimental

A process in which aqueous emulsions of oil are used has obvious advantages over a process in which it is necessary to employ an inflammable solvent. Palmer and Blow (1938) have advocated the use of cation-active agents for the deposition of mineral oil on to wool during certain stages of manufacture, but it is not possible to ascertain from their published data whether complete exhaustion of the emulsion was obtained. During a previous investigation carried out in these laboratories on the influence of cation-active emulsifiers such as cetyl pyridinium bromide upon the electric charge of oil drops (Powney and Wood, 1940), it was found that high positive charges could be established on the drops at extremely low concentrations; furthermore, it was found that at these very low concentrations the electric charge on many non-oily surfaces (usually negative) underwent a relatively insignificant change. It was thought, therefore, that this effect might possibly be utilized to obtain the complete discharge of a dilute oil emulsion on to fabrics.

Oiling of Wool Fabrics

Preliminary small-scale tests on wool showed that it was possible completely and rapidly to exhaust a dilute oil-in-water emulsion stabilized with a certain concentration of cetyl pyridinium bromide. The amount of oil which can be applied to wool fabric in this manner may be adjusted to almost any requirement. It is necessary for an effective discharge that the liquor shall be maintained in a slightly alkaline state—e.g., at *p*H 8—as under this condition the cation-active agent is rapidly adsorbed by the wool. It should be emphasized that, by this method, only that amount of oil which is actually required on the fabric is added to the machine, the final waste liquor being virtually clear water. For convenience, concentrated 20% oil emulsions were prepared, and were diluted according to the amount of oil required on the fabric.

Example

100 g. wool fabric.
1,000 c.cm. soft water at 100° F.
25 c.cm. positively charged stock oil emulsion stabilized by "fixanol C."*

The fabric was squeezed by hand in this liquor for approximately 10 minutes, after which time all the oil had apparently been taken up by the wool, the resulting liquor being quite clear. The fabric was then hydro-extracted and air-dried. If the deposition of oil was complete there would have been 5% of oil (based on the dry weight of the fabric) present on the wool. The oil content of the sample was ascertained by means of extraction with petroleum ether:

Oil on fabric (calculated)	5%
„ „ „ (found)	4.8%

Practically all the oil had therefore been deposited on the fabric.

Oiling of Cotton Fabrics

By using the above method with cotton fabrics some difficulty was experienced in obtaining complete deposition of oil from the positively charged emulsion. This was overcome by using half the requisite amount of oil as a positively charged emulsion, and subsequently adding the remainder of the oil as a negatively charged emulsion.

Example

100 g. cotton fabric.
1,000 c.cm. soft water at 100° F.
17.5 c.cm. positively charged stock oil emulsion stabilized by "fixanol C."

The procedure in this instance was to squeeze the cotton fabric for 2 to 3 minutes in this liquor and then to add 17.5 c.cm. of a negatively charged stock oil emulsion stabilized by "teepol."† On further squeezing up to 10 minutes deposition was again apparently complete. The fabric was hydro-extracted and dried as before. In this instance the oil content of the dry fabric should have been 7% if all the oil had been deposited:

Oil on fabric (calculated)	7%
„ „ „ (found)	6.9%

Large-scale Operation

At this stage the results of the preliminary laboratory experiments appeared to be satisfactory enough to warrant the operation of the process on a large scale. Arrangements were therefore made for a series of tests to be carried out in scarlet fever and measles wards at the L.C.C. North-Western Hospital in order to ascertain how the incidence of cross-infection was affected by the use of oiled bed-clothes and ward hangings. The British Launderers' Research Association undertook to oil all the necessary articles at its Research Station after they had been washed and rinsed at the hospital laundry. During a period of four months some four tons of articles, including sheets, blankets, pillow-cases, counterpanes, bed-jackets, nightgowns, bibs, restrainers, nurses' gowns, black-out curtains, screens, etc., were treated in normal laundry washing machines.

Oiling takes place after the goods have been correctly washed and rinsed, and it is emphasized that level oiling cannot be obtained if fabrics are washed in hard water, whereby deposition of calcium and magnesium soaps occurs. The last rinsing water is adjusted to a predetermined volume by observing the height of the water in the dip gauge on a standard rotary washing machine, typical processes for the oiling of woollen and cotton articles being given below.

Two aqueous emulsions of technical white oil were prepared; the positively charged emulsion employed "fixanol" as the stabilizing agent at an approximate concentration of 2%, while the negatively charged emulsion employed "teepol" as the stabilizing agent at an approximate concentration of 3%. The

* "Fixanol C" is a cation-active agent of the cetyl pyridinium bromide type manufactured by Imperial Chemical Industries Ltd. The paste contains approximately 50% of active material.

† "Teepol" is an anion-active agent based on the sodium salts of sulphated secondary alcohols of average chain length 13.2 carbon atoms. The product contains approximately 22% of active material, and is manufactured by Technical Products Ltd.

quantity of oil used in each case was equivalent to 20% of the mixture by volume, and it was finely dispersed by employing an emulsifier which operated on the jet principle. These strong emulsions tended to cream on standing, and it was essential to stir thoroughly before removing the requisite quantities for addition to the washing machine. There would appear to be no reason, however, why more concentrated emulsions containing up to 40 to 50% of oil should not be prepared; and the tendency to cream might be considerably minimized by using a more efficient homogenizer.

Process A—for Oiling Woollen Goods

1. Size of rotary washing machine, 34 in. by 54 in. Dry weight of load, 70 lb.
2. Adjust the quantity of softened water used in the last rinse so that, when the machine is running with the load in, the gauge glass registers a dip of 10 in.
3. Adjust temperature of water to 100° F.
4. Add stock "fixanol" emulsion (20% oil content)—1¼ gallons.
5. Run machine for 10 minutes, interrupting the rotation periodically to minimize any tendency of the goods to shrink.
6. Stop machine and unload.
7. Hydro-extract and dry in the normal manner.

This process will give a level deposition of oil equivalent to 5% of the weight of the goods.

Process B—for Oiling Cotton Articles

1. Size of rotary washing machine, 34 in. by 54 in. Dry weight of load, 100 lb.
2. Raise temperature to 100–120° F.
3. Add stock "fixanol" emulsion (20% oil content)—1¼ gallons.
4. Run machine for 2 to 3 minutes without interrupting the rotation.
5. Add stock "teepol" emulsion (20% oil content)—1¼ gallons.
6. Run machine for a further 7 to 8 minutes without interrupting the rotation.
7. Stop machine and unload.

This process will give a level deposition of oil equivalent to 6% of the weight of the goods.

During the present hospital trial it was found that the majority of the "woollen" articles to be treated were in fact composed of a mixture of wool and cotton; in view of this it was necessary to use Process B for such articles, since it was found that if Process A, for pure woollens, was used there was an uneven distribution of oil between the wool and the cotton components. The use of Process A for articles of pure wool is optional, since they can also be effectively oiled by Process B. It must be stressed here that the successful operation of this type of oiling process depends largely upon its being preceded by an efficient laundry washing and rinsing procedure. This is particularly true if adequate rinsing of the load has not been carried out, or if there is an accumulation of lime soaps on the articles owing to the use of unsoftened water. Apart from these considerations there is no reason why the oiling should not be carried out by the normal laundry staff, and if the machines used are afterwards rinsed out with hot water no difficulty should be encountered with subsequent washes. After hydro-extraction the load can be finished by the normal methods. No appreciable amount of oil is lost during the calender-drying of cotton articles. There is a slight but unimportant decrease of oil content when blankets and other woollen articles are autoclaved at 5-lb. steam pressure. Thus wool test-pieces having an average oil content of 5.2% showed an average oil content of 5.07% after treatment in an autoclave at 5-lb. steam pressure for one hour.

Accumulation of Oil

Over a period of successive oilings and washings it was found that there was a definite accumulation of oil in the case of woollen articles, which can only be given a low-temperature wash. Mineral oil such as technical white oil is well known to be extremely difficult to remove completely from textile fibres, and it is therefore not surprising that a progressive building up should occur. It is not desirable that the oil content should rise appreciably above about 5 to 7%, and the degree to which this accumulation may occur will depend largely upon the efficiency of the particular washing process. It is therefore not possible to give any general recommendation by which it can be prevented. A fairly steady degree of oiling can probably be maintained if in the initial oiling treatment an increased amount of emulsion is used and in all subsequent treatments the amount of emulsion is reduced below that given in the process chart. If laboratory facilities are available the most satisfactory method of control is to incorporate a wool and a cotton test-piece in the respective types of load and to remove, after each oiling, a sample for Soxhlet extraction with petroleum ether. In this way any serious accumulation of oil can readily be detected and appropriate adjustments in the amounts of emulsions used can be made.

Discussion

During the present investigation it has been found possible, by the use of suitable emulsifiers, to oil hospital bed-clothes, etc., to any required degree by means of very dilute oil-in-water emulsions. The particular advantage of the present process over that previously described by van den Ende and Thomas is that complete exhaustion of the emulsion takes place, and there is therefore no necessity for applying any oil-recovery process to the used liquor. Both positively charged and negatively charged oil emulsions have been employed, either separately or in equivalent amounts. The cation-active emulsifier "fixanol C" and the anion-active emulsifier "teepol" have been used in the present investigation, but there is no reason why other commercial emulsifiers of similar types should not be used. The methods described are applicable on a large scale in any hospital laundry that observes a correct washing technique.

We tender our thanks to the Council of the British Launderers' Research Association for permission to publish this paper.

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OILED FLOORS TO CONTROL RESPIRATORY INFECTION

AN ARMY EXPERIMENT

BY

P. H. R. ANDERSON, M.B., Ch.B., B.Sc.
Lieut.-Col., R.A.M.C.

J. A. BUCHANAN, M.B., Ch.B.
Capt., R.A.M.C.

AND

J. J. MacPARTLAND, M.B., B.Ch.
Capt., R.A.M.C.

The use of spindle oil to lay the dust on floors and so diminish the number of bacteria in the air was described by van den Ende, Lush, and Edward (1940), and by Thomas (1941). The importance of such air-borne organisms in the spread of respiratory and cross-infections has been emphasized by many writers (Cruickshank, 1935, 1941; White, 1936; Allison and Brown, 1937; M.R.C. War Memo. No. 6, 1941). It therefore appeared of some importance to see if oiling of floors could be used to cut down the spread of air-borne infections among soldiers in barracks. An experiment to test this possibility was suggested and arranged by Col. W. W. S. Sharpe, and was carried out between Dec., 1942, and March, 1943. It gave encouraging results, and, as the general conclusions seem to have aroused some interest (*British Medical Journal* leader, 1943), it may be of value to give a short account of the details.

Conditions of the Experiment

The experiment involved the men in two Army units, A and B, each of which was a large training centre occupying one complete barracks. Oiling of floors was carried out in unit A, while in unit B, which served as a control, the floors were untreated. The two barracks were almost identical in structure, and the men in each lived and worked under closely comparable conditions. The medical officers of units A and B were well known to each other and were able to agree on common standards for the diagnosis of respiratory infection. This was taken to include all cases arising *de novo* which fulfilled either one or both of the following criteria: (1) An upper respiratory

catarrh *with obvious local signs.* (2) A generalized "influenzal infection" *accompanied by pyrexia.*

The diagnosis of a respiratory infection was therefore based on objective evidence which, so far as possible, left no doubt as to the nature of the condition. The diagnosis was not made unless there was sufficient reason for supposing that symptoms and signs were due to *recent* infection. On this ground the following were excluded: (1) Men with chronic bronchitis. (2) Men with cough but without nasal discharge or pyrexia. Such coughs were attributable to excessive smoking, wax in the ears, training exposures to D.M. gas, or various minor causes. (3) Men who developed coryza or pharyngitis following vaccination: this group presented the only real difficulty, since a considerable but approximately equal number of men in the two units showed inflamed throats or a mild degree of coryza at the height of the vaccine reaction.

The proximity of the two units made it possible, if real doubt arose, for both medical officers to examine the man before a final diagnosis was made. In general the matter was not in doubt, since the great majority of respiratory infections were straightforward examples of acute coryza, pharyngitis, laryngitis, tracheitis, acute bronchitis, or influenza. Over the period of observation both units were receiving recruits at intervals of about a fortnight, so that during the 17 weeks of the experiment a large number of men came under review who were experiencing communal barrack life for the first time.

Oiling of Floors

In unit A the wooden floors of all barrack-rooms, sleeping-huts, offices, and lecture-rooms were treated with spindle oil at regular intervals. The oil was applied in such a way as to leave an imperceptible film on the surface after thorough impregnation of the wood. Oil treatment of the floors of unit A began in Nov., 1942, and four applications were made at about monthly intervals up to the end of March, 1943. The oil was non-inflammable and caused no unpleasant smell. The best results were obtained if the floors were first thoroughly swept with a stiff broom, then dry-scrubbed, and finally swept with a soft broom before the oil was applied. This was done with old sacking, which was dipped in the oil, squeezed to get rid of excess, and then well rubbed into the floor along the grain of the wood; no excess of oil was allowed to collect or remain on the floor. The surface dried in about six hours, and one gallon of oil was enough to treat about 1,000 square feet of floor space. Second and subsequent applications made at intervals of about four weeks occupied less time than the first; care was again taken to ensure that the oil was thoroughly rubbed in and no excess left on the surface. After treatment the floor was not scrubbed, but was easily kept clean by brushing or occasional mopping with a rag moistened in oil. Within the unit the regimental officers and men welcomed the oiling of floors—a point of some importance. The floors were easier to keep clean, scrubbing being unnecessary, and the presence of dirt on the oiled floors was so readily apparent that the men were stimulated to adopt cleanly habits.

The floors of unit B—the control unit—were left untreated, and in both units careful weekly records were kept of all men reporting sick with a respiratory infection during the 17 weeks ending March 27, 1943.

Results

The results are shown in the accompanying Table. It is clear that the weekly rate of new cases of respiratory infection per 1,000 men was consistently lower in unit A, where the floors were oiled, than in the control unit B, where no such treatment of floors was adopted. It is also of importance to note that unit A suffered no major epidemic of respiratory infection, while unit B sustained a severe outbreak of almost epidemic proportions between the middle of February and the first week of March.

Discussion

It is not claimed that this is in every respect a perfectly controlled experiment, but the basis of comparison between the two units is probably uniform enough to support the validity of the results. At each unit almost identical conditions prevailed as regards buildings, sleeping-space per man, stress of training, contact with sources of infection outside the barracks, and the standard of black-out ventilation. The units were large (strength 1,300 to 1,700) and yielded obvious respiratory infections in sufficient numbers to reduce the doubtful cases to an insignificant proportion of the whole. Another factor of importance was that close collaboration between the medical officers of the two units helped to eliminate extraneous factors which might have introduced error.

Table showing Weekly Rate of Respiratory Infections per 1,000 Men in Test and Control Units

Week Ending	Respiratory Infections per 1,000 Men	
	Unit A (Floors Oiled)	Unit B (Control; no Oil on Floors)
5/12/42	4	18
12/12/42	3	27
19/12/42	4	20
26/12/42	2	17
2/ 1/43	4	47
9/ 1/43	2	47
16/ 1/43	8	38
23/ 1/43	12	45
30/ 1/43	7	32
6/ 2/43	11	48
13/ 2/43	8	58
20/ 2/43	9	56
27/ 2/43	12	52
6/ 3/43	8	48
13/ 3/43	8	44
20/ 3/43	5	31
27/ 3/43	9	20
Weekly average ..	7	38

The success in curtailing the spread of purely respiratory infections by oil treatment of floors assumes all the greater significance since it is possible that such important diseases of the barrack-room as virus influenza and cerebrospinal meningitis may also be lessened in their incidence by the same simple procedure.

Summary and Conclusions

Treatment of wooden floors with spindle oil at regular intervals significantly lowered the rate of respiratory infections in a large military unit as compared with the incidence in a similar control unit, living under comparable conditions, where oiling of floors was not practised.

In the unit where floors were oiled the average rate of respiratory infections was 7 per 1,000 men, as against 38 per 1,000 men in the control unit. During the 17 weeks of the experiment, from the week ending Dec. 5, 1942, to that ending March 27, 1943, no major outbreak of respiratory infection appeared in the test unit; in the control unit an outbreak of almost epidemic proportions prevailed between the middle of February and the first week of March.

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THE DETERMINATION OF BASAL METABOLISM ON OUT-PATIENTS

BY

J. DOUGLAS ROBERTSON, M.D., D.Sc., Ph.D., D.P.H.

(From the Courtauld Institute of Biochemistry, Middlesex Hospital)

Measurement of the basal metabolism is not often employed as a routine investigation in this country. One cause may be that most clinics insist that the subjects live in hospital for a few days in order that the test can be carried out at or near the bedside. Such a preliminary preparation is neither popular with the patient nor looked on favourably by the hospital whose beds are already outnumbered by patients requiring urgent medical and surgical treatment. In this paper proof will be given that in fact it is not necessary to use hospital beds for this test and that determinations on ambulatory patients are satisfactory. At the same time certain technical points on the measurement, accuracy, and constancy of the basal metabolism will have attention drawn to them.

The method of determining the metabolism was that of the closed circuit, the accuracy of which has already been reported (Robertson, 1937). The apparatus used was the Benedict-Roth with recording kymograph. All machines were alcohol-checked

(Barrett and Robertson, 1937), but in addition each is checked once a week by a model whose basal metabolism is in the region of 56 calories an hour.

Findings

In the tables which follow, an attempt is made to answer some of the controversial problems in metabolism, such as the number of observations necessary to obtain an accurate result, the effect of exercise on the basal metabolism, and the accuracy of determinations on ambulatory patients.

First, 100 patients were studied on two consecutive days, with duplicate readings each of 10 minutes a day; the results are given in Table I. No significant difference was found

TABLE I.—*A Study of 100 Consecutive Patients having Two Tests on Two Consecutive Days*

	Mean Heat Output (cals./sq.m./hr. ± σm*)	Significance of Difference, P†
Initial reading	39·0 ± 0·75	P>0.4
Second reading on 1st day	38·9 ± 0·76	
Basal reading on 1st day	38·3 ± 0·76	P<0·001
" " " 2nd "	36·4 ± 0·67	

* σm is the standard error of the mean. † P (Fisher, 1938).

between the two readings taken on the first day ($t=0.895$; $P > 0.4$). There was, however, a significant fall in the basal metabolism on the second day compared with the first ($t=8.3$; $P<0.001$). This finding in addition to a smaller standard deviation on the second day favours a study of the patient on at least two days.

Next, in Table II, are a series of 26 subjects studied on two successive days as before; but on the afternoon previous to the first standard reading two practice tests, of the same

TABLE II.—*A Study of 26 Subjects having Two Tests on Two Consecutive Days (but Two Practice Tests similar in Duration to the Basal Tests were carried out on a Previous Afternoon)*

	Mean Heat Output (cals./sq.m./hr. ± σm)	Significance of Difference, P
First reading on first day under basal conditions	36·7 ± 0·46	P>0·20
Second reading on 1st day	36·2 ± 0·45	
Basal reading on 1st day	35·8 ± 0·39	P<0·001
" " " 2nd "	33·9 ± 0·37	

duration as the actual tests, were carried out. The element of training was thus introduced before the first observation under basal conditions. Despite this, however, a significant fall in the metabolism took place on the second day ($t=6.4$; $P < 0.001$). Once again the two first-day readings were not significantly different ($t=1.34$; $P > 0.20$). Thus whereas a dummy reading or practice test is often of value in relieving the anxiety of some patients, it cannot replace the test, under basal conditions, carried out on two separate days.

To determine whether the metabolism continued to fall as the number of observations increased, a series of 14 subjects were studied on six successive days; the results are given in Table III. Again a significant fall on the second day was

TABLE III.—*A Study of 14 Subjects having Two Tests on Six Consecutive Days*

	Mean Heat Output (cals./sq.m./hr. ± σm)	Significance of Difference, P
Basal test on 1st day	35·5 ± 0·96	P<0·001
" " " 2nd "	33·5 ± 0·75	
" " " 3rd "	33·5 ± 0·80	
" " " 4th "	33·6 ± 0·83	
" " " 5th "	33·5 ± 0·75	
" " " 6th "	33·1 ± 0·83	P>0·2

noticed ($t=4.07$; $P<0.001$). But a comparison of the second day with the sixth day (the days with the maximum disparity, excluding the first-day tests) showed no significant difference ($t=1.36$; $P > 0.2$). Thus by the second day a reproducible basal metabolism can be recorded.

The subjects studied above in Table III were normal healthy volunteers (nurses). A similar study was now made on persons suffering from thyrotoxicosis, and these are given in Table IV.

TABLE IV.—*A Study of 7 Cases of Thyrotoxicosis having Two Tests on Seven Consecutive Days*

	Mean Heat Output (cals./sq.m./hr. ± σm)	Significance of Difference, P
Basal test on 1st day	63·2 ± 3·1	P<0·01
" " " 2nd "	57·1 ± 2·6	
" " " 3rd "	55·1 ± 1·9	
" " " 4th "	54·9 ± 2·2	
" " " 5th "	55·1 ± 1·9	
" " " 6th "	54·1 ± 2·2	P>0·1
" " " 7th "	55·1 ± 2·0	

As with normal subjects, a significant fall in metabolism occurred on the second day ($t=3.51$; $P < 0.01$). The fall continued to take place daily, reaching its maximum on the sixth day, but a statistical study showed that this further fall is of no significance. If the second- and sixth-day readings are compared (the days with the maximum disparity in their means) no significant difference is found ($t=1.73$; $P=0.1$). Thus cases of thyrotoxicosis by the second day give a satisfactory and reproducible reading of their basal metabolism.

In Table V the effect of exercise on the basal metabolism is shown. The subjects (12 normal, and 5 cases of thyrotoxicosis) were first studied under basal conditions. After this

TABLE V.—*A Comparison of the Metabolism under Basal Conditions with the Same Metabolism following Exercise. After the exercise the subjects lay down on a couch and the metabolism was measured without preliminary rest for the next 40 minutes*

No.		12 Normal Subjects		5 Cases of Thyrotoxicosis	
		Mean Heat Output (cals./sq. m./hr. ± σm)	Significance of Difference, P	Mean Heat Output (cals./sq. m./hr. ± σm)	Significance of Difference, P
a	Under basal conditions	35·3 ± 0·47	a & b<0·001	55·0 ± 1·7	a & b<0·001
b	0–10 min. after exer.	40·2 ± 1·06		64·3 ± 2·8	
c	10–20 " " "	36·8 ± 0·50	a & c<0·01	57·1 ± 1·6	a & c=0·01
d	20–30 " " "	35·7 ± 0·47	a & d>0·3	54·7 ± 1·5	a & d>0·6
e	30–40 " " "	35·2 ± 0·48	a & e>0·4	55·1 ± 1·7	a & e>0·8

reading was taken, they rose, and descended and ascended the steps of the Courtauld Institute (95 steps; distance down, 55 feet) in approximately 2¼ minutes. In both normal and thyrotoxic subjects the metabolism again became basal after a rest of only 20 minutes.

Finally, a comparison was made between the metabolism measured under strictly basal conditions and that under ambulatory conditions. Full details of the routine carried out by four subjects after rising and leaving their homes for the metabolism department are given in Table VI. Despite in some cases quite appreciable exercise and the exposure to an outside temperature about freezing-point, half an hour's repose on a couch in a room at a temperature of 20 to 23° C. was adequate to reproduce basal conditions.

Discussion

Different clinics do not appear to have the same system of assessing a subject's basal metabolism. There is no unanimity about the number of tests, the number of daily observations, and whether to report a mean of all results or the lowest reading. In some clinics it is the usual custom to carry out only a single determination without any preliminary practice, thus excluding the element of training (Boothby, Berkson, Dunn, 1936). Those authors, however, add that the initial reading is accepted "unless at the time of the test and before its calculation it was noted as unsatisfactory for reasons of restlessness, observable nervous tension, or an elevated temperature." There are several objections to Boothby *et al.'s* technique. First, so-called nervous tension is not uncommon at the initial test, and particularly in cases of thyrotoxicosis. Secondly, initial readings are commonly higher, and sometimes much higher, than subsequent or true basal determinations. Thus in a series of 223 subjects aged 19, 156 (70%) gave initial readings which were significantly higher than those on the second day, 48 (22%) gave results 10% or more higher, 21 (9%) gave results 15% or more higher,

TABLE VI.—*A Comparison of the Bedside and Ambulatory Estimations of the Basal Metabolism*

Name	Surface Area (sq. m.)	Bedside Tests After a Night's Rest in the Metabolism Room at temp. of 20–23° C. (cals./sq.m./hr.)	Ambulatory Tests taken After ½ hour's Rest on a Couch in the Metabolism Room at temp. of 20–23° C. (cals./sq.m./hr.)	Outside temp.	Procedure Carried out Before Arrival at the Metabolism Department
P.C.W.	1·91	34·4; 35·8; 34·2 Mean, 34·8	34·8	0° C.	7.30: Rose, washed, shaved, dressed
			34·7	8° C.	7.55–8.09: Walked uphill ½ mile to station
			35·2 Mean, 34·8	9° C.	8.09–8.50: In train reading newspaper and talking with fellow passengers 8.50–9.10: Bus from Victoria Station. Walk of ¼ mile to metabolism department
E.R.S.	1·86	35·5; 35·6; 34·8 Mean, 35·3	35·3	3° C.	7.15: Rose, shaved, warm bath, dressed
			34·1	9° C.	7.30: Cycle 1½ miles, climbing ca. 100 ft.
			35·1 Mean, 34·8	0° C.	7.50–8.45: In train, reading and talking. Walk of ¼ mile to metabolism department
A.G.C.M.	1·69	34·2; 32·2 Mean, 33·2	34·6	12° C.	7.45: Rose, shaved, warm bath, dressed
			33·0 Mean, 33·8	15° C.	8.05–8.20: Walked ¼ mile to station 8.20–8.45: In train, reading and talking. Walk of ¼ mile to metabolism department
F.S.G.	1·76	33·5; 35·0 Mean, 34·3	32·6	8° C.	8.00: Rose, bathed, dressed
			33·9 Mean, 33·3	10° C.	8.15–8.30: Walked ¼ mile to station 8.30–9.05: In train, reading and talking. Walk of ¼ mile to metabolism department
Mean of 4 subjects ..		34·4	34·2		
Significance of difference ..		P > 0·6			

and as many as 11 (5%) gave readings as elevated as 20% higher. In no case was the initial reading at the time of the test considered unsatisfactory. The series was a group of nurses who had volunteered for the test. To judge a subject's basal metabolism on only a single observation is to run the risk of reporting a raised instead of a normal metabolism. Thirdly, if standards are based on initial readings then the metabolic assessment of subjects who have ever had the test before becomes difficult. The experience of a test previously means training which Boothby *et al.* suggested should be excluded. Finally, the controlling influence of iodine on the basal metabolism of thyrotoxicosis as a diagnostic test becomes much less sensitive; for, indeed, it would be very difficult to determine whether a fall in the metabolism in a subsequent test after iodine was due to the element of training or to iodine.

In other clinics several readings are taken on one day, and either the mean or the lowest reading is accepted as the basal metabolism. Other clinics prefer observations carried out on several days, and again the mean or the lowest reading is taken as the basal metabolism. As the technique for assessing a subject's basal metabolism appears to vary in different clinics, one must expect some disparity in their respective results.

The findings in this paper are that by the second day of basal conditions, with few exceptions, a reproducible result can be obtained for the basal metabolism of normal people and cases of thyrotoxicosis that is constant over a period of several days at least. It has been the custom in this department, therefore, to adopt a certain technique in measuring and reporting on the basal metabolism: it is the attendance of the subject on two successive mornings after the customary fast of at least 12 hours. After half an hour's rest on a couch in a room at a temperature of 20 to 23° C. duplicate determinations, each of 10 minutes' duration, are taken. On the second day the results are commonly lower than on the first; but if this is not so, the subject is asked to attend on another morning. On the day with the lowest reading the duplicates are expected to agree within 5% (or attendance on a further day is requested), and the lower of the two readings is reported as the basal metabolism.

It is suggested that the measurement of the basal metabolism in this country is not commonly carried out because insufficient use is made of ambulatory determinations. There is a reluctance to accept results on ambulatory patients because they are believed to be inaccurate. This is an entirely false conception without any experimental evidence to support it. Proof has here been shown that in fact metabolism determinations on ambulatory subjects are as accurate, uniform, and reliable as those carried out at the actual bedside if half an hour's repose on a couch in a warm room precedes the determination. Benedict and Du Bois, in a personal communication, stated this interesting fact many years ago, and their findings were confirmed at that time. It is interesting to note that cases of thyrotoxicosis as well as normal subjects, in so short a period as 20 minutes' rest on a couch, can reproduce basal conditions even after such exercise as walking down 95 steps and up again in 2¼ minutes. From a diagnostic point of view it is unfortunate that cases of thyrotoxicosis respond no differently to exercise than do normal subjects. For if, in thyrotoxic cases, half an hour's repose on a couch was insufficient to reproduce basal conditions, the effect of exercise on the metabolism might constitute a sensitive diagnostic test for mild cases of thyrotoxicosis. Attention has been drawn to these mild cases of thyrotoxicosis with a basal metabolism apparently normal yet actually raised (Robertson, 1934). Iodine in conjunction with the basal metabolism will invariably detect these mild cases. In that paper a proved case of thyrotoxicosis was described in which an initial basal metabolism of minus 8 fell to minus 27 on iodine (i.e., minus 27 was normal for the patient, so minus 8 meant a raised basal metabolism).

It is believed that the value of ambulatory metabolism determinations is still insufficiently appreciated in this country. The blocking of a hospital bed for several days for an examination of this nature adds considerably to its cost, and the patient is unwilling to co-operate because of loss of working hours, personal expense, and the like. The results given above indicate that there is no reason why an out-patient should not attend hospital in the morning for the test (approximate time, 1 hour), then return to his ordinary duties for the rest of the day. A test carried out early enough might result in no loss of working hours.

Summary and Conclusions

A reproducible metabolism measurement can be obtained if the subject attends for the test on at least two mornings under basal conditions. By the second day of the test, if the duplicates agree within 5%, then the lower of the readings can be taken as that subject's basal metabolism. If the second-day tests are higher than those taken on the first day, then further attendance is advisable until a constant reading is obtained.

The above technique can be applied with satisfaction to normal subjects and cases of thyrotoxicosis.

After reasonable exercise basal conditions can be reproduced after resting on a couch for approximately 20 minutes. A preliminary repose of half an hour before metabolism reading is taken is adequate for basal purposes.

A satisfactory, accurate, and reproducible metabolic reading can be obtained on "out-patients." These so-called "ambulatory determinations" are not significantly different from those tests carried out at the bedside under strictly basal conditions.

The reproducibility of the method described above for measuring the basal metabolism is within 5%.

It is a pleasure to thank Prof. E. C. Dodds for his criticism of this paper and the Government grants for scientific investigation, through the Royal Society, for the gift of a basal metabolism machine.

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NUTRITIONAL OEDEMA IN A VEGETARIAN

BY

J. MacDONALD HOLMES, M.D., M.R.C.P.

Physician to the Staffordshire General Infirmary and Wrexham and East Denbighshire War Memorial Hospital

Nutritional oedema has long been recognized as an accompaniment of gross disease of the alimentary tract and of conditions which lead to excessive loss of plasma proteins. It is commonly seen in conjunction with chronic dysentery and other conditions giving rise to chronic diarrhoea. It may be accompanied by symptoms of vitamin deficiency, such as peripheral neuritis or pellagra, and an anaemia of microcytic or macrocytic type is often associated with it.

The chief factor in the causation of nutritional oedema is generally considered to be a hypoproteinaemia, with a consequent lowering of the osmotic pressure of the blood and a disturbance of the balance of fluid distribution between the blood and the interstitial tissue spaces. Moore and van Slyke (1930) state that oedema develops when the total serum proteins fall below the critical level of 5.5 ± 0.3 g. per 100 c.cm.; but other factors, such as the intake and excretion of blood electrolytes, the blood volume, and the presence or absence of anaemia, must also influence the occurrence of oedema, so that it does not necessarily appear when the serum protein content falls below the so-called critical level.

In the absence of gross alimentary disease nutritional oedema is rare in this country, and even vegetarians are able to maintain an adequate protein intake, in spite of wartime restrictions in diet. The case to be described, however, illustrates how a vegetarian diet in association with a comparatively minor gastro-intestinal abnormality may cause a hypoproteinaemia of serious degree, giving rise to symptoms similar to the "hunger" or "famine" oedema which occurred endemically in Europe during the last war and which will no doubt occur again during this war.

Case Report

The patient, a woman aged 61, was first seen in consultation with Dr. B. A. Abbott, of Rugeley, on Aug. 3, 1943. During the previous few weeks Dr. Abbott had treated her for a severe anaemia by ferrous sulphate and small doses of liver extract intramuscularly. Although the anaemia had practically disappeared she had developed ascites and generalized oedema during the preceding ten days. In 1932 a gastro-enterostomy had been performed for pyloric stenosis due to a chronic ulcer, but no gastric symptoms had occurred since and her health had been good until the onset of the anaemia. She stated that she was an almost complete vegetarian, the only animal foods taken being milk and cheese. For the last eight weeks her appetite had been poor and her intake of milk had been low owing to rationing.

On examination she was pale but not grossly anaemic. Her skin was dry and had a slightly atrophic appearance. She had a red glazed tongue, sore at the tip, and her finger-nails showed a well-marked koilonychia. Gross ascites and a generalized oedema of the whole trunk were present, but oedema was only slightly evident in the face. There was some dyspnoea, and signs of free fluid were observed in both sides of her chest. The pulse rate was 100 per minute, but there was no cardiac enlargement or irregularity. B.P. 140/90. The urine was normal, containing no albumin or casts. Her mental state was normal, and she showed no neurological abnormality. There was no diarrhoea, and the stools were normal in appearance.

She was admitted to hospital for further investigation on Aug. 5. A diagnosis of nutritional oedema had been considered, but the possibility of gastric carcinoma with widespread secondary deposits had to be excluded. Investigations produced the following results: Blood count: R.B.C., 3,900,000 per c.mm.; Hb, 72%; C.I., 0.92; W.B.C., 10,200 per c.mm.—polymorphs 76%, lymphocytes 21%, monocytes 3%; slight anisocytosis and poikilocytosis of red cells. Total plasma proteins: 3.3 g. %—albumin 1.98%, globulin 1.32%. Serum sodium 313 mg., serum calcium 8.1 mg., and blood pyruvic acid 0.77 mg. per 100 c.cm. Fractional test meal: complete histamine-fast achlorhydria, with emptying time of 1½ hours. Pleural fluid: 46 lymphocytes per c.mm.; protein 240 mg., chlorides 620 mg. per 100 c.cm. An *x*-ray film of the chest showed large bilateral pleural effusions. Radiological examination of the stomach and intestinal tract revealed no abnormality apart from the gastro-enterostomy. During the first four days in hospital her urinary output was low, averaging about 600 c.cm. a day, without restriction of fluid intake. She continued her vegetarian diet during this time.

On Aug. 10 the patient was given two bottles of reconstituted plasma intravenously. On the 11th it was noticed that her urinary output had risen to 1,800 c.cm. during the 24 hours and her total plasma proteins to 4 g. %—albumin 2.66%, globulin 1.34%. Two more bottles of reconstituted plasma were given on the 12th, and she was persuaded, with some difficulty, to take a high-protein diet containing ample amounts of animal protein. During the next week the high urinary output was maintained and there was a rapid diminution in the ascites, generalized oedema, and pleural effusions. Her further progress was uneventful, and the ascites, oedema, and pleural effusions had disappeared completely in about ten days. Oral and intravenous glucose-tolerance tests were done on Aug. 14 and 15 respectively, and showed no disturbance of sugar metabolism. She has remained well up to the time of writing, having abandoned her vegetarian diet.

Comment

Hypoproteinaemia has been classified by Davis and Getzoff (1942) into three types: (1) *Prehepatic hypoproteinaemia,* in which there is interference with adequate intake, digestion, or absorption of plasma-protein building materials. In this type the ability of the liver to form plasma protein is not affected. (2) *Hepatic hypoproteinaemia,* in which there is inability of the liver itself to form plasma proteins, in spite of the fact that normal supplies of protein building material are received from the intestines. This type is usually associated with severe hepatic disease. (3) *Post-hepatic hypoproteinaemia,* in which there is an adequate formation of plasma proteins by the liver, but an abnormal loss of plasma protein, as in severe burns or prolonged haemorrhage or suppuration.

The case described was of the "prehepatic" type. The patient's vegetarian diet contained a minimal amount of protein, and when her appetite was poor her protein intake was further reduced. The complete achlorhydria no doubt interfered with adequate digestion, and so the plasma proteins fell below the level required to maintain the normal osmotic pressure of the blood. The achlorhydria also interfered with her iron intake and produced an iron-deficiency anaemia.

The treatment of severe degrees of nutritional oedema by a high-protein diet alone may be slow, and it seems reasonable to expect a more rapid response from intravenous plasma transfusions. This expectation was well borne out by the immediate increase in the urinary output after the first plasma transfusion and the rapid disappearance of the oedema.

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Medical Memoranda

The Use of Cyclopropane in the Field

Shortly before the second battle of Alamein I received, through the co-operation of the D.M.S., M.E.F., Major-General Sir Percy Tomlinson, A.M.S., and the Technical Adviser in Anaesthetics, M.E.F., Major R. W. Cope, R.A.M.C., a cylinder of cyclopropane for use in the forward areas. Since then I have had a small but adequate supply, and I have used it at a C.C.S. during the Eighth Army's advance almost to the end of the campaign, at a field surgical unit for the Sicilian campaign, and also for four months in Italy, from the landing at Salerno onwards. I think it is now possible to make some assessment of the value of cyclopropane for the type of case operated on in casualty clearing stations and field surgical units.

Approximately 1,200 cases were anaesthetized by me during this time. Pentothal alone was the drug used in 80% of the cases; cyclopropane, with or without the addition of nitrous oxide or occasionally ether, in 10%; local anaesthesia in 5%; and intravenous morphine in 5%. The cyclopropane was reserved for the penetrating wounds of the abdomen, the thoraco-abdominal wounds, and those few cases which were regarded as very bad risks and had failed to respond to resuscitative measures. It was found to be of great value in all these cases.

THE PROCEDURE

Penetrating Wounds of the Abdomen.—Most cases were already adequately morphinized, and no further premedication was given. They almost all came to the theatre with a slow blood drip going, and induction was usually effected by injecting 0.25 g. to 0.5 g. of pentothal. Intubation was done as a

routine in the early cases, but later it was found that many cases could be managed perfectly well without, and it was only done in those that presented special difficulties. The ease of control of the depth of anaesthesia, the quiet respirations, and the good oxygenation were features that were appreciated. No difficulty was experienced in obtaining adequate relaxation. Patients recovered quickly after operation, and their cough reflex was usually present before they left the theatre.

Thoraco-abdominal Wounds.—The same procedure was followed in these cases, except that intubation was done as a routine. Controlled respiration was used when necessary.

The Very Bad Risks.—Anaesthesia in these cases was effected with nitrous oxide and a high percentage of oxygen. Cyclopropane was added if necessary.

General.—The machine used was a Rochester Lundy Heidbrink. It has travelled many hundreds of miles over bad roads and tracks, and has been packed and repacked many times without damage. Two hundred and seventy gallons of cyclopropane have been used for 120 operations. The economy in cylinders thus effected is most striking. If semi-closed nitrous oxide, oxygen, and ether had been used in these cases about 120 100-gallon cylinders of nitrous oxide would have been required instead of the three cylinders of cyclopropane of the same size.

CONCLUSIONS

Cyclopropane was found to be of great value for penetrating wounds of the abdomen, thoraco-abdominal wounds, and bad risks.

A modern anaesthetic machine will stand up well to the constant moves and rough usage encountered in the field.

The economy in material effected by the use of the carbon dioxide absorption technique is demonstrated.

It must be emphasized that the circumstances which enabled me to be supplied with cyclopropane were unusual and that difficulties of supply would preclude its use on a large scale.

REX BINNING, M.R.C.S., L.R.C.P.,
Major, R.A.M.C.; Anaesthetic Specialist to a Field Surgical Unit.

Expectation of Life after Nephrectomy for Urinary Tuberculosis

The following cases which reported to me simultaneously last Christmas may be of use to those who are asked for prognosis in urinary tuberculosis:

CASE HISTORIES

Case 1.—A lady was sent to me from Singapore 45 years ago with a grave prognosis of urinary tuberculosis. The presence of tubercle was confirmed. On cystoscopy I found the right ureteral orifice dragged away from its angle in the trigone, and recognized that I was dealing not with a vesical tuberculosis but with tuberculosis of the right kidney and ureter. I removed the right kidney, which proved typical of the disease, but left the lower part of the thickened right ureter. This lady has reported yearly to me since then. She has married twice, and the son born subsequent to the operation joined the R.A.F. She is now 70, and though feeling the limitations of her age, is happy, free from pain, and moderately active.

Case 2.—Twenty-seven years ago I was consulted about an abdominal attack in a male case which I diagnosed as being due to disease of the appendix. The right epididymis was tuberculous and suppurating, and the patient had a small hard deposit of tubercle in the right prostatic lobe. On opening the abdomen I found the appendix normal, but the entire peritoneal surface was subacutely inflamed and the mesenteric glands were very large and obviously inflamed. I closed the abdomen without drainage. As the patient had tubercle bacilli in the urine, and cystitis, I gave a very grave prognosis; but he recovered, healing normally. He went to the South of France, and after a year or so (1920) my friend Prof. Wildbolz of Berne removed his right kidney. Later on he had cystotomy performed in Mentone and an "ulcer at the neck of the bladder scraped." Eventually he returned to London, and Sir J. Thomson-Walker punched out with a cupping forceps the deposit in the right prostatic lobe. This patient reports to me frequently. He is now 70, very active and without urinary symptoms, and able to enjoy life and take part in the social activities of a large provincial town.

Here are two cases of confirmed urinary tuberculosis, both pointing, I suggest, to the renal origin of the disease, and both relieved by removal of the focus in the kidney.

E. HURRY FENWICK, C.B.E., F.R.C.S.,
Consulting Surgeon, and at one time Professor of Urology, at the London Hospital.

J. C. McClelland (*J. Urol.*, 1944, **51**, 1944) records the case of a man aged 42 who was given sulphathiazole gr. 30 and sulphapyridine gr. 150 for acute otitis media in 48 hours. He developed anuria and died early on the seventh day. The pathological findings were not marked, nor did they seem to be sufficient to cause anuria and death. The ureters were not blocked with crystals.

Reviews

FEEDING BRITAIN

Achievement in Feeding Britain. By Gerald Bullett. (2s. 6d.) London: Pilot Press.

This is No. 5 of the "Achievement Books" which the Pilot Press are publishing. The series is under the general editorship of Mr. Noel Carrington. In his short foreword to this book Mr. Carrington says—truly enough—that the health of the nation has not only been maintained but in many instances actively improved during this war, in spite of severe rationing. Here the overworked general practitioner ironically comments: "In *many* instances, yes; but in *many more* instances the boot is on the other foot." Mr. Carrington, however, resuming his exordium, says: "So perhaps we should not only thank God with our daily grace before and after meals but occasionally pay a tribute to the almost miraculous work of those responsible for bringing us our rations—the seamen, the farmers, the dockers, the railway men, the shopkeepers; and, behind them all, the staff of the Ministry of Food." The suspicion of the cynical reader grows, in spite of the truth, justice, and good feeling of every sentence that Mr. Carrington writes—taking exception, possibly, to his grammar. But, to resume. Like the other works issued by the Pilot Press this is well printed on good-quality paper, and is illustrated on every page by one or more photographic reproductions, including several in colour, practically the whole of the photographs being supplied by the Ministry of Food—the hero of the book. The illustrations are most varied, though one misses a portrait of the author himself, who, after all, does the real work of this brochure. Still, nearly everything else is illustrated. There is a very nice portrait of a thrush dropping grubs into the wide-open mouths of its tiny nestlings, in their natural surroundings; while other pictures show a meeting of the Scientific Advisory Committee with Sir J. C. Drummond at the Ministry of Food; a land girl leading a bull to fresh quarters; miners and their families working on their allotments outside the pit-head; and a civic restaurant at Kingston with customers seated at the tables and the walls decorated by young artists. We have a photograph of the King studying a chart with Lord Woolton at headquarters, and one showing the contrast of "potatoes in plenty in 1943" with potatoes in scarcity in 1917. Lord Woolton has been called upon to preside over a difficult enterprise in which few men would have succeeded one-tenth as well as he has—thanks largely to his wise choice of scientific and other advisers, and his wisdom in knowing when wholly to follow their advice, when to follow it subject to modifications, and when to reject it altogether. But we must remember that "even Homer nods," even Socrates made mistakes, and the wisest doctor whom Harley Street has ever produced occasionally finds his diagnosis and prognosis disproved in the pathological laboratory and the post-mortem room. And the Minister of Food must not be confused with the Ministry of Food; nor must either be confused with "the Government."

One thing, however, is certain. Whoever is responsible for the choice made no mistake in getting Mr. Gerald Bullett to write this summing-up of the facts put before him. Mr. Bullett is known to a large part of the educated world as a poet of distinction and one of the finest and most tasteful of anthologists, his only serious English rivals being Sir John Squire, the Viceroy of India, "Q," G. K. A. Bell, and the Secretary of the Society of Authors. This gives considerable authority to any work of this kind that he may undertake; and we can be quite sure that, like Lord Woolton himself, he will obtain his facts from the best-reputed and most authoritative sources, and that he will bring both taste and common sense to the summing-up of these "scientific statements." Of course, even after all this care has been taken and this pictorial splendour has been laid before us, many of us, not the most thoughtless or nationally insolicitous, will occasionally raise our eyebrows and think twice before swallowing everything holus-bolus. Here, for instance, are a few memories of my reading and observation that give occasion for pause.

Most readers of the *B.M.J.* are familiar with the name of Hindhede, the celebrated doctor who dealt with the Danish food problem in the last great war. In his book, *Protein and Nutrition*, which was published in Danish in 1906 (when he was studying this problem), he refers to the Sikhs. He agreed with most people that taken as a whole the Sikh is one of the finest types of man to be found in Asia; is independent without being insolent, resolute and firm in character, and remarkably free from petty bias and prejudices. "He respects himself, and, as a result, commands the respect of others; he is a soldier by instinct and tradition, regards cowardice as worse than a crime, and, with his splendid physique and well-bred ways, is one of the finest of Oriental races." Yet he says that the ordinary trained Sikh takes only two meals daily—morning and evening—and has meat only twice a month. (Dr. Hindhede says that the diet corresponds very nearly with that which has been used for years in his—the author's—home "and it has been found to be ample for our needs. Stomach disorders are unknown to us, and we are unacquainted with scurvy except by name.")

Then again some of us will recall a book entitled *The People's Food*, published a year before the present war started, the author being the "Advertising Practitioner" (his own description of himself), Sir William Crawford. His book is a very interesting one, written only in part for the welfare of the community at large if we remember that the community is composed of individuals, but full of sensible and helpful ideas. Here, perhaps, is his main conclusion:

"To handle the food problem of the future a Food Research Institute is necessary—on which all those interested in health, nutrition, food, are represented. It would direct research into such problems as those quoted from the first report of the Advisory Committee on Nutrition. It would carry out economic investigations and surveys regarding food consumption and the food market. It would take the lead in setting new standards of purity and quality in food, as Lord Horder, in his presidential address to the Royal Institute of Public Health, in the previous year, advocates to safeguard public interests. It would handle schemes of educational propaganda to direct food consumption into the most valuable channels, schemes which would form the background to advertising campaigns for specific foodstuffs which producers and manufacturers might themselves launch. It would be at the service of those statesmen, those health and medical officers, those social workers, and those producers referred to in the opening chapters of this book as being so specially in need of a full understanding of the food market."

Such a machine is necessary to carry a new policy into action. The policy itself is plain. Just as last century the advocates of preventive medicine fought the battle for proper sanitation, so this century they will fight the battle for proper nutrition. Just as to-day sound drains and clean water are the *sine qua non* of civilized life, so will a proper diet come to be regarded as the necessity of all classes of the community.

My memories call up ideas and criticisms in book after book in my library. There is *Health and Longevity through Rational Diet*, written by Dr. Arnold Lorand of Carlsbad, the quotation on the title-page being from Brillat-Savarin: "Tell me what thy food is, and I will tell thee what thou art." Another very interesting little book is one with a cardboard cover—*Cookery without Flesh*, printed and published in 1818, in which perhaps the most relevant section is the one on bread and bread-making. In this chapter it is stated that "the most wholesome bread is made by grinding down whole grain, only separating the coarser bran; or what is called meslin bread, consisting of wheat and rye ground together." I and many other people wish the devisers of the present national bread had insisted on only the coarser part of the bran or husk being removed, leaving the living germ immediately under the outer husk intact. That, of course, entirely alters the food adequacy, the tastefulness, and the moisture-retaining quality of the bread—reminding one of the old farmhouse bread. But, of course, it would not suit the miller so well, as the flour does not "keep" so long.

In conclusion, I strongly advise every reader of the *B.M.J.* who has time to read anything else at all to buy, beg, or borrow Mr. Bullett's first-rate introduction to a really important subject with which all doctors are, or ought to be, concerned.

HARRY ROBERTS.

CLINICAL PARASITOLOGY

Clinical Parasitology. By C. F. Craig, M.D., F.A.C.S., F.A.C.P., and E. C. Faust, M.A., Ph.D. Third edition, thoroughly revised. (Pp. 767; illustrated. 45s.) London: Henry Kimpton. 1944.

The fact that a third edition of this book has been called for in the space of seven years is a sufficient indication of its high value. The present edition has been thoroughly revised and the various sections brought up to date. A perusal of its contents shows that very little has been left out. The new edition contains 40 new figures and four coloured plates illustrating malarial parasites. These greatly enhance the value of the book, which still remains the best one available on the subject of clinical parasitology, meaning by this the morphology and life-history of organisms in the fields of protozoology, helminthology, and entomology which are responsible for producing disease in man, the methods of their identification, the pathological conditions they produce, and the means of treatment and prevention. The book will be chiefly of use to laboratory workers in the field of tropical medicine, whether at home or abroad, and it should be available to all who are called upon to investigate cases of sickness in those who have been exposed to tropical infections.

The book is profusely illustrated, and for this reason it is perhaps a pity that the spirochaetes of relapsing fever in the blood are not figured, and that there is no illustration of toxoplasma, which is attracting an increasing attention. The subject of rat-bite fever might with advantage have received some notice. However, these are minor matters that can hardly detract from the excellence of the book, which is of special value at the present time.

RED CROSS WORK IN CHINA

The Red Cross at Work in China. Published on behalf of the United Aid to China Fund (57, New Bond Street, London, W.1.) at 1s. Compiled by F. M. Osborn.

This little book consists chiefly of extracts from letters written by Dr. R. B. McClure, a Canadian medical missionary, born and reared in North China—a graduate in medicine of Toronto University. Soon after Japan attacked China he became field director for the International Red Cross, with supervision of staff and equipment in 14 hospitals throughout North and Central China. After much adventurous service he flew to England in 1938 to inspire interest in China and to raise funds for the organizations helping the wounded and distressed. He found ready and willing help from the British Fund for Relief of Distress in China, the British Red Cross Society, and the organizations now co-operating as the United Aid to China Fund, of which Lady Cripps is president. Before returning to China in 1938 Dr. McClure made a quick trip to Canada and the United States to arouse sympathy there. This little book is well written. It gives a faithful account of all the difficulties that had to be overcome in taking relief to tragic China in her struggle against Japan. It is evident that splendid work has been carried out by the Red Cross, notably by the Friends Ambulance Unit, staffed by British personnel and financed by America—ambulances, a mobile workshop, and two vehicles forming a mobile surgical unit, one containing a miniature theatre and the other an *x*-ray plant. They were shipped direct to Rangoon and taken to China with great difficulty over the Burma Road. Later in the year the British Foreign Office made a grant of £50,000 for this ambulance relief work. With the help of many photographic illustrations and interesting descriptions in Dr. McClure's letters we are able to visualize the splendid character and courage of the Red Cross work that has been done for China. There was tragic need of such aid, and ample evidence is shown of the deep appreciation of Chinese wounded soldiers and the many thousands of pitiful refugees. From beginning to end this work is full of human interest. The book is published on behalf of the United Aid to China Fund, and all the surplus, after paying for paper and printing, goes to that fund. It is well worth a shilling.

Notes on Books

Mr. HAMILTON BAILEY'S *Demonstrations of Physical Signs in Clinical Surgery* first appeared in 1927, and has now reached a ninth edition. It is published at Bristol by John Wright and Sons; price 25s. Readers who are familiar with the eighth edition will recall that it was necessary to replace all the illustrations, the blocks and originals of which were destroyed by enemy action. By introducing a number of new pictures and replacing old ones the author and his publishers have tried to improve the work still further. Some parts of the text have been recast; others have been rearranged and correlated more closely with their appropriate pictures.

Physical Treatment of Anterior Poliomyelitis, by DIANA B. KIDD, C.S.M.M.G., is published at 6s. by Faber and Faber. A hearty welcome may be extended to this little book, in which the modern principles and methods of treatment of the paralysis of acute poliomyelitis are expounded clearly and with adequate detail. We may hope that it will find its way into the hands of all who have to administer this treatment, and that it will sound the knell of the old and ineffective methods of "rubbing" and "electrical treatment" that for so long have passed muster as treatment in this disabling malady. The only criticism, and this a minor one, that must be made is that the various paragraphs dealing with pathological and clinical aspects of poliomyelitis and other affections of the nervous system, for which the methods described have value, are not always accurate. Disseminated sclerosis is *not* an extrapyramidal system disease, and to speak of "emotional centres" in the brain is to confuse categories. The book would be the better if this aspect of it were submitted to a neurologist for amendment in any future editions.

The second edition of *Gas-and-Air Analgesia*, by R. J. MINNITT (Baillière, Tindall and Cox; 5s.), remains appreciably the same as the previous one. The book is a short but clear exposition of the principles and practice of gas-and-air analgesia in labour, with particular reference to the author's apparatus. It is written primarily for midwives, but it has its lessons, too, for doctors and others who have the comfort and welfare of the parturient woman at heart.

Preparations and Appliances

A PORTABLE WARMED ETHER-AND-AIR ANAESTHETIC APPARATUS

Dr. A. MEREDITH MILLAR writes from Colwyn Bay:

The object in designing this apparatus was to provide a machine which would be easily portable and deliver a warm mixture of ether and air, the concentration of which could be changed rapidly or maintained the same for a period of time, and to ensure that the mixture would arrive *at the face warm*. It was to be simple so that any anaesthetist could use it. It was hoped it would allow anaesthesia to be maintained at any level.

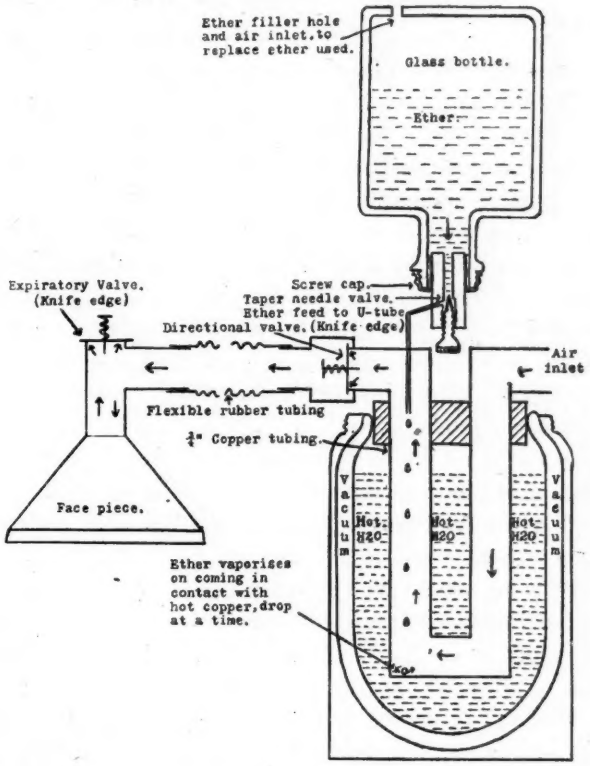
The apparatus consists of two bottles, each fitted with a drip feed, which is controlled by a needle valve; a quart vacuum flask; a U-tube of 3/4 in. diameter copper tubing, with one end open to the air and the other having a one-way directional valve permitting air to be drawn through the tube but not returned; a short length of rubber tubing (3/4 in. diam.); a face-piece and expiratory valve.

Action.—The vacuum flask is filled with hot water, and the U-tube immersed in it. Ether is put in one bottle and vinesthene anaesthetic mixture into the other. Either of these is fed into the U-tube, where it drops into the hot metal and vaporizes, mixing with the air, which has already become warm while in the U-tube. This mixture is drawn in by the patient. As the ether lands on the hot tubing it makes a hiss, which is easily heard, thus indicating the rate of flow. This varies with each case and as the case goes on. To ensure that too great cooling does not take place before the mixture reaches the patient's face, the length of tubing used is not more than 12 in. long.

Induction.—Induction is usually smooth and completed in 3 to 5 minutes as a rule. Vinesthene anaesthetic mixture is used to induce as it gives quicker and smoother induction than ether, particularly where premedication has not been adequate. The change over is made by the gradual addition of ether and reduction of V.A.M.

Maintenance of Anaesthesia.—When the desired level of anaesthesia has been reached it is easily maintained and alterations in depth are quite simple. If anaesthesia has become too light, it is noticeable that it may be deepened without coughing, as would occur with open ether. In fact a lighter plane of anaesthesia may be maintained. The temperature of the water when starting the anaesthetic was 190–200° F, which gradually dropped as anaesthesia proceeded. During this time the face-piece, expiratory valve mounting, and rubber tubing all warmed up, so that the mixture was still at about body heat, as it had been at the start. In most cases the water kept warm enough for 1½ hours' use, allowing as many as four operations to be performed without a change of water being necessary. The time it lasted warm depended on the amount of ether required to anaesthetize the patient.

Economy.—From this last observation a saving of ether might be expected, and this was borne out in practice. The average for my series of unselected cases was 6.43 oz. an hour. The following are the figures for the first 58 cases that I did: Average age 33¼; average induction time 4¼ min.; average time of anaesthesia 27¼ min.; average amount of ether per case 3.02 oz.; average amount of V.A.M. per case 0.39 oz.; 38½% of the patients vomited. Premedication was usually with morphine, atropine, and seconal.



Disadvantages and Advantages.—The slowness of induction as compared with N_2O or cyclopropane is a drawback. It can partly be overcome with practice and if economy of V.A.M. is not considered. The main advantages of the apparatus are the smooth anaesthesia and good post-operative condition of the patient; its ease of portability and use; the fact that an intratracheal anaesthesia may be given with such a simple apparatus; and its economy. For a head operation the apparatus can be placed so that it is not in the way and the anaesthetist can also be well away from the field of operation, because not only can the drops of ether be heard at the air inlet but the breathing also. The patients have a feeling of well-being which surprises and pleases them, and the hospital staff are also pleased at the reduction in their work.

I should like to thank Mr. D. I. Currie, Mr. H. Lord, and Dr. F. J. Bennett for allowing me to use this apparatus when anaesthetizing their patients.

SULPHAMEZATHINE SODIUM

Imperial Chemical (Pharmaceuticals) Limited now offer their "sulphamezathine" brand of sulphadimethylpyrimidine in the form of a stable solution of the sodium salt for intramuscular and intravenous administration. It is available in ampoules each containing the equivalent of 1 g. "sulphamezathine" (in 3 c.cm.) packed in boxes of 6 and 25.

PROTEOLYSED LIVER

Allen and Hanburys Ltd. announce that supplies of this product are now available for the oral treatment of patients suffering from pernicious anaemia or other megalocytic anaemias. It has a pleasant flavour and can be administered by dissolving in soup or warm water. 1 oz. of proteolysed liver A. and H. is equivalent to 8 oz. of fresh liver. Available in two sizes, 4 oz. and 8 oz.

BRITISH MEDICAL JOURNAL

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CROSS-INFECTION BY DUST

Next to chemotherapy the study of cross-infection has been perhaps the most notable feature of medical progress during the war, and it is a study in which this country has led the world. The proof that one patient has infected another often depends on the closest possible identification of the micro-organisms recovered from each of them, and is therefore possible in infections due to common species only when these are divisible into many serological types. Unfortunately from the point of view of specific immunization, but very fortunately for the purposes of epidemiological study, there are two important species of which this is true. Just as the serological typing of the pneumococcus is a product almost entirely of work in the U.S.A., so that of haemolytic streptococci—apart from the broader method of grouping devised by Lancefield—is entirely the work of an Englishman. No survey of this subject is complete without a tribute to the work of the late Frederick Griffith, to which the achievements of others in tracing the migrations of haemolytic streptococci are entirely due. The knowledge so gained of cross-infection, particularly in surgical wards dealing with wounds and burns, and in E.N.T. and fever wards, has posed a problem to which the answers are still being found, though many have yet to be applied. It is an indication of the importance attached to this subject that two of the M.R.C. War Memoranda are devoted to it, No. 6 dealing solely with the problem as it affects surgical wards, and No. 11, published and reviewed in these columns only a few weeks ago,[1] embracing cross-infection of all kinds.

There are two principal ways in which cross-infection can occur: through the air and by contact, either direct or mediate. The second of these routes embraces every kind of failure in aseptic technique, including some which were unsuspected until recently and unprovided for in usually accepted rules. By no means everyone yet appreciates the infectivity of a patient's skin at some distance from his wound, of apparently unsoiled outer dressings or of the outer surface of a soiled plaster, or the capacity of haemolytic streptococci for survival on all manner of objects used by an infected patient. On the other hand, an even more striking fact brought fully to light only in the past three years is the degree and persistence of infection in ward dust. All observers who have studied this quantitatively agree in their findings that dust from wards where there are patients with haemolytic streptococcal infections may contain hundreds of thousands or even millions of these organisms per gramme. They are also known to survive in this medium for long periods: while a substantial number will certainly survive under favourable conditions for a month; a few survivors in naturally infected dust kept in the dark have been observed by L. P. Garrod[2] after a lapse of over six months. The production of such dust is still something of a mystery even to those best acquainted with it. It consists mainly, as does all domestic dust, of particles of wool or cotton, and many of these are evidently contaminated with infected wound exudate or throat secretion. However produced, it remains an obvious menace, accentuated whenever it is scattered into the atmosphere by bed-making or floor sweeping. One important question which remains unanswered is how much cross-infection in the average ward is due to dust and how much to some form of contact. In other words, have we to concentrate on purifying the ward atmosphere or on improvements in aseptic and general nursing technique? This is by no means easy to answer, as may be gathered from a careful study recently made by Edward.[3] This comprised quantitative bacteriological examinations of dust at intervals of a week for six months in two wards, one for E.N.T. and eye cases and the other a children's ward, together with regular swabbing of throats and any septic lesions in the patients and staff. The numerous haemolytic streptococci recovered were typed, and the types found in the dust were usually those with which one or more patients were known to be infected. On the other hand, there sometimes appeared in dust a fresh type which had not been isolated from any patient, presumably having been introduced from without by a patient attending for a dressing. In spite of this very close method of observation, and of the occurrence of numerous cases of hospital infection, no conclusive evidence was obtained of its transmission by dust.

Perhaps the clearest evidence hitherto forthcoming of the proper apportionment of blame to dust and contagion respectively, at least in one type of ward, is to be found in the paper by Joyce Wright, R. Cruickshank, and W. Gunn in this issue of the *Journal*. There is, as is now well known, one method of dealing with the dust danger which can be applied anywhere, regardless of hospital structure or the absence of up-to-date cleaning facilities, and this is the use of oil to make dust particles sticky, so that they undergo agglutination on the floor instead of remaining easily dispersible in the air. This treatment was applied with the utmost thoroughness, not only to the floor—which alone was almost without effect—but to almost every fabric article in the ward, notably the bedclothes and the patient's garments. An identical ward, also accommodating patients with measles, was not so treated. In the oiled ward total counts of bacteria and haemolytic streptococci in the air during bed-making and sweeping were reduced by about 91 and 98% respectively, both from counts previously obtained in the same ward and those which continued to be obtained in the control. The inci-

[1] *British Medical Journal*, 1944, **1**, 497.

[2] *British Medical Journal*, **1**, 245.

[3] *J. Hyg.*, 1944, **43**, 256.

dence of infection by the Type 6 haemolytic streptococcus then prevalent in both wards was only 18.6%, whereas in the control it was 73.3%, and the frequency of otitis media was 2.8%, as against 14.3% in the control. This is clear evidence that under these conditions dust is a major factor in cross-infection, and the demonstrated infectivity of various ward articles can account for only a small fraction of the troubles to which such wards are subject. Valuable as this evidence is, it should perhaps be accepted as applicable only to wards for infections confined to the respiratory tract. Where wounds are concerned, contact may possibly play a greater and dust a lesser part, although it is hard to believe, in view of these very definite findings, that dust can ever be unimportant.

This paper is one of three which deal with different aspects of the same subject. That the oiling of floors alone may be useful in living-rooms as distinct from hospital wards is evident from the interesting experiment made by Lieut.-Col. Anderson and his colleagues in two Army barracks. Floor oiling in one of these was accompanied by a striking diminution in the frequency of respiratory infections, and the significance of the figures obtained seems unquestionable in view of the care evidently taken to provide an exact control, and to observe and record in both units according to the same plan. That those responsible for cleaning liked oiling as a system, apart from its benefit to health, is an encouraging fact. A third paper is by three members of the staff of the British Launderers' Research Association Laboratories, who were invited to study the oiling of fabrics with a view to devising an economical process which would be feasible in any laundry. In this they have well succeeded, since it appears that by adding a small amount of a cationic detergent the oil in an oil-in-water emulsion can be caused to be wholly absorbed by wool. Blankets can thus be impregnated with any desired amount of oil, leaving a fluid from which no surplus oil has to be recovered. Cotton requires somewhat more complex treatment, but on the same principle. If, as seems probable, this process comes to be recognized as an essential safeguard in many hospital wards, these authors' instructions will no doubt be widely followed in the future.

THE HEALTH OF MALTA

From the outbreak of war with Italy till the grand release of 1943 the brave people of the Maltese Islands suffered grievous destruction of their property and the increasing privations of a state of siege. During the "prolonged and prodigious" bombardments, when alerts sometimes ran on for forty-eight hours at a stretch, nearly the whole population had to resort to shelter life. Even in the rare periods of comparative quiet they were obliged to live under grossly overcrowded conditions because so many homes had been shattered. The hospitals suffered badly, and emergency services were in constant operation. In addition to anxiety and ever-present danger there was a progressive deterioration of the simple conditions of everyday life. The water supply and the sanitary services were damaged again and again. The preparation of meals was beset with difficulties, as the essential services of electricity and gas were frequently cut off. As time went on, food rations, as well as allowances of soap, water, and fuel, had to be curtailed. It was hard to maintain bodily cleanliness. The calorie value of the diet dropped to a dangerously low level as the siege became more severe, and fresh protective foods such as eggs, milk, and butter were practically unobtainable. Fresh meat, mainly from goats and horses, was reserved for hospitals, and all milk was strictly rationed to those in urgent need. The people in general subsisted on vegetable soup, some tinned meat or fish, and a little fat, oil, and beans.

The reports of the Chief Government Medical Officer for the years 1941 and 1942 tell a painful but triumphant story of suffering and loss patiently borne until the day of victory. It is not surprising that there was a heavy mortality at the extremes of life, and the health department had to contend with a high incidence of typhoid fever and disturbing outbreaks of dysentery. Unhappily all the conditions favouring the spread of tuberculosis were present, and the disease took full advantage of its opportunities. The mortality from pulmonary tuberculosis rose from 437 per million in 1939 to 843 in 1942, and the non-pulmonary death rate showed a corresponding increase from 133 to 431, giving a total tuberculosis death rate of 1,274 per million persons living. Scarcity of soap favoured the spread of scabies and other clamorous infestations, but these were quickly controlled when services and normal supplies were resumed. The general prevalence of infectious disease was not so great as might have been expected from the wretched conditions of living, but unhappily a sharp outbreak of acute anterior poliomyelitis occurred in the winter of 1942–3, represented by over 400 cases. There have always been sporadic cases on the islands, but this is the first instance of an epidemic. The restriction of food supplies told a plain story. Loss of weight, especially in children, was much in evidence in the later stages of the siege, and there were a few cases of nutritional oedema and rickets. Septic conditions of the skin, ulcerative stomatitis, and other signs of vitamin deficiency were unmistakable, and scurvy appeared among the old. There was a moderate amount of pellagra. These conditions improved rapidly when the siege was raised.

The medical and health department of the Maltese Islands never faltered in the time of trial. The services were carried on in the face of fearful odds, when the added burden of emergency medical services strained the resources to the utmost. The people of Malta have received the George Cross as a worthy token of their courage, but the time is approaching when a more substantial recognition is due. Among the many ruined homes there were slums and unhealthy houses; standards of family life often fell short of the decency and order of a flowering civilization. The great disaster must be turned to greater advantage by building good homes in well-designed towns, "with amenities that would render existence more useful and more pleasant both to the individual and to society as a whole." The Chief Medical Officer rightly adds that it will be a far-reaching tragedy if this unique opportunity is lost.

BIOLOGICAL VALUES OF MIXED PROTEINS

It has been realized for at least twenty years that a mixture of proteins may have a higher biological value than that of the separate proteins in the mixture,[1] [2] and that a relatively small addition of animal protein may considerably raise the biological value of a predominantly vegetable diet. This supplementation occurs when one protein contains an adequacy of one or more amino-acids in which the other proteins of the diet are deficient. For example, gelatin—a protein which itself has an extremely low biological value, since it is completely devoid of several essential amino-acids—has three times the lysine content of wheat proteins, and hence when mixed with the latter produces a mixture better able to provide the body's amino-acid needs—i.e., is of higher biological value than the wheat protein alone.

Very few reports illustrating the working of this principle in practical European diets have been published, no doubt owing to the considerable technical difficulties in the collection of representative meals and in the determination of biological value. The recent paper of Macrae, Henry, and Kon,[3] on the proteins in food served in R.A.F. messes is of special interest in this respect. At each of four R.A.F. stations the total food available to five men at all meals during one week was collected by taking plates at random from the men as they left the serving table. The food was frozen to −20° for a week and homogenized in the frozen condition. The biological values and true digestibilities were determined by giving each diet (slightly diluted to equalize the protein and fat content) in turn to each member of a group of young growing rats and measuring their growth rates and nitrogen balances. Significant differences were found in the biological values and digestibilities of each protein, though all were high, the extreme figures for biological value being 77.6 and 81.2. The protein values of the diets—that is, the product obtained by multiplying biological value, digestibility, and level in the diet,[4] [5]—also showed variations, values of 9.5, 11.1, 11.1, and 12.2 being obtained for the four diets. Only three single foodstuffs are known to have biological values greater than those found for these mixed proteins. One of these foods, eggs, was absent from the R.A.F. diets; the second and third, milk and white fish, each contributed a mere 5% of the total proteins. The animal protein was calculated by Macrae *et al.* to be about 43% of the total protein of each diet. Hence the inclusion of 57% of vegetable protein had raised the biological value of the mixed protein to a figure higher even than that of the majority of the individual animal proteins.

These experiments were carried out in October–December, 1941, but the protein position of both civilians and Services has been improved since National flour became compulsory early in 1942. The experiments of Chick,[6] though contested by Wright,[7] are generally accepted as showing superiority in biological value of the proteins of National over white flour. In the R.A.F. diets studied only one-third of the flour, providing 6 to 10% of the total proteins, was of the National variety. Assuming that these determinations of biological value based on rat experiments are applicable to man, it would seem that with the amino-acid contribution of National flour supplementing the other sources of amino-acids in the diet, there need be no qualms about the protein value of our diet during the fifth year of war.

1 Mitchell, H. H., *J. biol. Chem.*, 1924, **58**, 873, 905.
2 —— and Carman, G. G., ibid., 1926, **68**, 183.
3 *Biochem. J.*, 1943, **37**, 225.
4 Mitchell, H. H., *J. Home Econ.*, 1927, **19**, 122.
5 —— and Hamilton, T. S., *The Biochemistry of Amino Acids*, New York, 1929.
6 *Lancet*, 1940, **2**, 511.
7 *British Medical Journal*, 1941, **2**, 689.

A SHORT GUIDE TO V.D.

When general practitioners were asked to undertake the treatment of venereal diseases under the Ministry of Health's scheme it was obvious that they would need some guidance. This was provided in a little pamphlet issued by the Ministry of Health and the Department for Scotland entitled *Venereal Disease: Guide for Practitioners* and drawn up by Col. L. W. Harrison. The name of the author is a sufficient guarantee of the quality of the contents, and it can be said at once that it seems hardly possible that this pamphlet could be improved. In fewer than 20 pages is compressed almost all the average general practitioner would want to know about the job he has been asked to undertake; particularly clear are the sections on the taking of specimens and the interpretation of reports of serum tests. These two matters are of paramount importance when one realizes how essential it is that the diagnosis of syphilis, with all that it entails, should be made only on almost incontrovertible evidence. Diagnosis, treatment, and tests of cure are set out with the utmost clarity, and sections are included on equipment, sterilization, and care of solutions and instruments, and in an appendix appliances and drugs required. If any criticism is to be made it would seem that: (1) Four gonococcal complement-fixation tests in three months after completion of treatment of gonorrhoea are rather excessive; (2) the taking of a specimen of prostatic and vesicular secretion one week after apparent cure is rather early when a case has cleared up in a few days under chemotherapy; and (3) irritating the urethra by instilling Lugol's iodine as a test of cure would not appeal to all venereologists. Further, it might be useful to explain how to dissolve neo-arsphenamine preparations—i.e., by sprinkling the powder lightly on to the distilled water, not by pouring the distilled water on to the drug. This is an excellent publication, with the stamp of quality all over it; those who treat venereal disease should study it carefully. Copies may be obtained through the M.O.H. of the county or county borough.

MISLEADING NAMES

It is clear from correspondence in this *Journal* that the word "mitis" applied to diphtheria bacilli, and, by extension, to cases of the disease, has some tendency to mislead the general practitioner. The Leeds workers who first used the term could readily separate the cultures got from undoubted clinical cases of diphtheria into three broad groups. "Gravis" was mainly found in severe infection with toxaemia, bull neck, and a high incidence of paralytic and cardiac complication; it gave a characteristic colony on heated blood agar and tellurite plates, and fermented starch and glycogen. "Mitis" grew in a different form on these media, did not ferment starch, and occurred more often in mild attacks of diphtheria. "Intermedius" can be considered an intermediate variety of *C. diphtheriae* nearer the "gravis" end of the scale.

The danger appears to be that a doctor may conclude that an infection with "mitis" can be regarded as a "mild" infection, not demanding such instant administration of antitoxin and other proper measures. Any view of this kind might endanger the patient. McLeod[1] in a recent review analysed some 25,000 cases of diphtheria the bacilli from which had been typed. Though the mortality was lower in the "mitis" group—2.6% among 6,858 cases, while 11,492 "gravis" cases had a death rate of 8.1%—181 patients infected with "mitis" died. It is true that the paralytic and cardiac complications were two to three times more common in the "gravis" group than in the

1 *Bact. Rev.*, 1943, **7**, 1.

"mitis," but laryngeal obstruction occurred three to four times more often in the "mitis" group. We do not know how many of these 181 victims would have been saved by an early diagnosis of diphtheria and the instant injection of 2 or 3 c.cm. of modern "refined" or enzyme-treated antitoxin (which has a very small tendency to cause "serum reaction"), but it is safe to suggest that many would have been saved.

It is a fascinating epidemiological problem that strains behave somewhat differently in different areas—thus "intermedius" has often been the most virulent of the three types in Liverpool and several other areas. "Mitis" in the small collection of 310 American cases caused a death rate of 8.1%. M. Frobisher,[2] writing from Baltimore, finds the strict determination of the types so often in disaccord with their effect on the patient that he speaks of an unfortunate confusion between clinical and bacteriological terminology, and favours the application of Roman numerals to the half-dozen or more serological groups that the laboratory worker is able to make in McLeod's three groups. McLeod,[1] after a survey of the world literature available at the middle of 1942 and discussion of the serological subgroups within his main three groups, considers that the three groups "gravis," "intermedius," and "mitis" comprise all the cultures yet identified—except "a small percentage of strains." Whether further research in different parts of the world increases this small percentage to a larger one or not, the terms introduced by the Leeds workers are probably near enough to the truth to have come to stay. An interesting feature of the whole problem is that, though diphtheria antitoxin in use in the whole world was made almost entirely for many years from the descendants of one culture, Parke 8, generally considered to be an "intermedius" variety, the brilliant success in immediate stoppages of outbreaks of diphtheria by the injection of this antitoxin was virtually unbroken, though widely separated epidemics must have been caused by many different bacillary types. Further, it is virtually true that the nursing staff in diphtheria wards can be kept entirely free from attacks of diphtheria by immunization with prophylactic made from this same Parke 8 intermedius strain, though they must repeatedly be exposed to infection by all types when nursing.

THE KENNY METHOD CRITICIZED

Under the title "Fact and Fancy in Poliomyelitis" there appeared in the *Journal* of July 31, 1943, a critical review of a book by Pohl and Kenny in which the latter's methods of treatment in acute poliomyelitis, and the hypothesis by which the method was sought to be rationalized, were fully discussed. The "new concept" of the disease proposed that the well-known lesions in the motor nerve cells of the ventral horns of the cord were irrelevant, and that true paralysis from destruction of nerve cells was exceptional and unimportant, but that the residual symptoms were due to shortening and wasting of inflamed muscles which had not been properly treated in the initial stage of the illness. The essential lesion of the disease is, according to this concept, an inflammatory condition of muscles leading to spasm, pain, temporary "mental alienation" of muscles, and incoordination. All this is curable by the Kenny method of hot packs and re-education exercises initiated at the earliest possible moment after diagnosis, and the permanent disabilities with which we are all so familiar are due solely to the neglect to combat the muscular inflammation by the Kenny procedures. In short, we have never treated the malady properly because we did not recognize its true nature. It was easy to expose the fantastic nature of the new concept, and in a recent article J. A. Key[1] provides the necessary criticism of the method. He states that all the cases of so-called cure obtained by the Kenny method that have come under his observation have been those of patients who were never paralysed but belonged to the abortive or non-paralysed group that bulks so large in every epidemic. In claiming 80% of cures for her method Sister Kenny, he says, has omitted to point out that she includes cases of this category, if indeed she recognizes it. In addition she contrasts this figure of cures with the 12% of cures recorded by McCarroll, whose cases came under observation and were treated only because they were in fact already paralysed. Key deprecates the use of broadcast and of lay press to advertise claims of this order.

In a detailed comparison of orthodox and Sister Kenny's methods of treatment Key states that the latter tend to aggravate the illness and to disturb the patient because they involve the application of hot packs and the use of re-education exercises in the initial febrile stage of the illness; that they are wasteful of man-power and of material; that they are applied to many cases that, being of the abortive variety, do not require it; that they lead to unnecessarily prolonged immobilization of the patient on his back; that they handicap mobilization also by the neglect to use appropriate mechanical walking and other supports; that they omit the proper assessment of muscle weakness; that they tend to prolong pain and spasm and do not prevent the development of stiffness and muscle shortening. Finally, he says, patients are buoyed up by extravagant promises of cure. In no case are the results better than by the use of the methods commonly adopted.

These conclusions will tend to confirm doubts left in the minds of readers of Pohl and Kenny's book already referred to. The new concept was manifestly untenable, and it now appears that the method itself is open to objection, and claims made in respect of it have not shown the dispassionate and careful character we have the right to expect of them. It is particularly unfortunate that the direct appeal to the lay public by Press and radio, indicated by Key, should have been made. The public cannot be judges of pathological hypotheses or of therapeutic methods, and false hopes are raised by extravagant and ill-founded claims made in this way. It is not so many years ago that the scientific assessment of the value of convalescent serum in poliomyelitis was prejudiced by such publicly made claims. These claims effectively prevented the making of the necessary control observations, for public opinion in the countries concerned would not tolerate the withholding of serum, for which high claims had been made, from any proportion of cases. The only valid appeal when a method of treatment is under investigation is to expert judgment, given due time and opportunity of observation. A campaign that ignores this principle and flies to the public emotional appeal over the heads of the only proper tribunal does its cause a disservice and gives nothing to medicine.

The next session of the General Medical Council will open on Tuesday, May 23, at 2 o'clock, when the President, Sir Herbert Lightfoot Eason, will take the chair and deliver an address.

Correction.—The lecture on "Teaching and Practice in Preventive Medicine," by Dr. J. M. Mackintosh, noted in last week's issue, will be given on June 23—not June 2—at the London School of Hygiene and Tropical Medicine, and it is not a public lecture.

[1] *Surg. Gynec. Obstet.* 1943, **77**, 389.

[2] *Amer. J. publ. Hlth.*, 1943, **33**, 1244.

AERIAL CONVECTION FROM SMALLPOX HOSPITALS

BY

C. KILLICK MILLARD, M.D., D.Sc.
Ex-M.O.H., Leicester

Forty years ago the theory of the spread of infection from smallpox hospitals to the surrounding population by means of "aerial convection" was accepted by a majority of epidemiologists and regarded as definitely established. To-day the theory has receded into the background, and many are frankly sceptical as to its validity. Thus Harries and Mitman, in their *Infectious Diseases* (second edition, just published) say, in referring to this question, "There are still some who hold the view," but it is clear that they themselves disbelieve in it. In Jameson and Parkinson's *Synopsis of Hygiene,* published in 1934, the theory is not even mentioned, though they give the Ministry of Health's regulations as to the siting of smallpox hospitals, which are based on the theory. It scarcely seems likely that this omission was an oversight. Parkes and Kenwood's *Public Health* is also against it. C. V. Chapin, formerly Superintendent Officer of Health for Providence, U.S.A., in his *Sources and Modes of Infection,* published in 1910, after discussing the question at some length sums up against the theory; and he gives the impression that this is the general view in America.

The question is by no means of merely academic interest. On the contrary, it is of considerable practical importance. Local authorities throughout the country have to make provision for the isolation of smallpox, even though it be only for odd cases which may never occur; and to comply with the Ministry of Health's regulations such hospitals have to be at least a quarter of a mile from another institution or population of 200, and at least half a mile from a population of 600. To maintain all these institutions, seldom or never used, is not an economic proposition; and to open one in a hurry, at short notice, and provide the requisite staff, is often most inconvenient. If the theory of aerial convection can really be disregarded as of no practical importance, there seems no reason why smallpox cases should not be treated in a separate ward in a general isolation hospital with better supervision and much less inconvenience.

It seems desirable, therefore, that the whole question should be reviewed by going back to the original reports upon which the theory was based; and by the courtesy of the Medical Department of the Ministry of Health I have been given access to the Ministry's Medical Library, where I have been able to refer to these reports and other relevant literature. This article is based upon what I have recently been reading.

History of the Aerial Convection Theory

It was in the great epidemic of 1871 that the Metropolitan Asylums Board began to isolate smallpox cases in hospital; and until 1886, when cases were removed to the Hospital Ships at Long Reach, on the Thames, to the east of London, the smallpox hospitals were situated inside the Metropolis and surrounded by thickly populated areas. It was in respect of Fulham Hospital, in 1881, that W. H. Power, a medical inspector of the L.G.B., demonstrated the influence of the hospital on the prevalence of smallpox in its neighbourhood. He was able to show, and illustrate by a series of spot-maps, that following the use of this hospital for smallpox a graduated intensity of smallpox incidence occurred among the surrounding houses, the percentage of houses invaded becoming gradually less as the distance from the hospital increased. This "influence" of the hospital could be observed up to at least one mile. He satisfied himself, after careful inquiry, that this influence could not be explained by "hospital operations"—i.e., contact with the hospital staff, visits of tradesmen, movements of ambulances, and visits of patients' friends or relatives. He therefore propounded the theory of "aerial convection," or distal conveyance of infection through the atmosphere. Although this had often been suggested before, Power was the first to put the theory forward officially and attempt to justify it scientifically.

The striking facts obtained with regard to Fulham naturally led to inquiry as to whether other smallpox hospitals in London had brought about increased prevalence of the disease in their surrounding neighbourhoods; and in the Report of the Medical Officer of the L.G.B. for 1886 there was published a section—"Statistics of Smallpox Relative to the Operation of Smallpox Hospitals in the Metropolis"—which showed unmistakably that during the period 1876–85 the hospitals receiving acute cases had been associated with an excessive prevalence of smallpox in surrounding areas. Similar evidence was forthcoming from smallpox hospitals in the Provinces. Speaking in 1886 at a special debate on this question before the Epidemiological Society, Dr. G. S. (afterwards Sir George) Buchanan said:

> "We cannot get away from these facts; they are as definite as any known to epidemiology. They had already been ascertained by a multiplicity of careful and detailed observations, in many hospitals, in different epidemics, in London and the Provinces. Recent epidemics have now enabled the question to be tested afresh."

That smallpox hospitals have had a deleterious influence in disseminating the disease in surrounding areas is now admitted, so there is no need for this aspect of the case to be argued further; but it is noteworthy that with no other disease has a similar influence been established. In this respect smallpox stands alone, which proves that its infectivity is exceptional. It is as to the explanation of the influence exercised by smallpox hospitals that difference of opinion exists.

Those who disputed the theory of aerial convection argued that the increased prevalence around hospitals could be explained by human contact in connexion with the normal operations of the hospital, supplemented by irregularities due to laxity of discipline. Against this line of reasoning there was the fact that only in the rarest instances could any contact, direct or indirect, be discovered, in spite of searching inquiry; the great majority of the cases occurring in the vicinity of hospitals were untraceable except on the theory of aerial convection. This is quite contrary to the usual experience in investigating the aetiology of smallpox cases, for careful inquiry will generally elicit some human contact, direct or indirect. There was also the fact that the increased incidence did not follow the main traffic routes to and from a hospital. Moreover, it was pointed out that when hospital staff go on leave they do not visit in the immediate vicinity of a hospital, but rather make for the shopping centre and places of entertainment; also, that tradesmen are not usually appointed because they happen to reside near to the hospital, and that visitors to patients come from all parts of a town where the patients themselves reside. Lastly, even though laxity of discipline might account for occasional spread in the early days, it is to be expected that it would be tightened up after attention had been publicly drawn to the danger. Yet in the case of the Fulham Hospital the influence reported by Mr. Power in 1881 was found to be again in operation in the epidemic of 1885.

Some epidemiologists still seem to think that there is an inherent improbability in aerial convection, so it may be well to say a word about this. It may be taken for granted that the infection of smallpox, as with all infectious diseases, is particulate, and we know that finely particulate matter—carbon, cement, lava—can be carried by the air for great distances. In some manner the infection of smallpox leaves the patient's body and gets into the air of the sick-room or ward, and a susceptible person inhaling that air will readily contract the disease. Infection, then, can be carried by the air for short distances, and this may happen in the open air as well as in the sick-room. The only real question is, For how long can the infection survive exposure to the outside atmosphere? And here it is important to remember that the infection of smallpox, probably more than that of any other disease, can be carried by fomites. This fact certainly suggests that it is exceptionally resistant to desiccation and that it can survive for considerable periods outside the human body. This may explain why aerial convection has been demonstrated only in the case of smallpox. It would seem, therefore, that there is really no inherent improbability in the theory; it is just a matter of weighing the evidence.

Smallpox in the Orsett Union

The theory of aerial convection as opposed to contact conveyance by hospital operations received striking support from

the experience of the Orsett Union, in the epidemic of 1901–2, in connexion with the Hospital Ships at Long Reach, where cases of smallpox from the Metropolis were then being treated. These hospital ships were moored in the Thames near the Kentish shore, while the Orsett Union was on the opposite or Essex side. During this epidemic the Orsett Union suffered severely, and the outbreak was the subject of a special report by Dr. G. S. Buchanan. He wrote:

"The most striking feature of the epidemic is the remarkable intensity of its incidence on the small community of Purfleet. . . . Out of 110 dwellings no less than 44 were invaded by smallpox. . . . As regards the influence of the hospital ships upon the prevalence of smallpox in Purfleet, we have to choose between aerial convection or nothing; there is here no question of infection, direct or mediate, through human intercourse or traffic."

Purfleet was the parish in the Orsett Union which was the nearest to the ships on the Essex side of the river, but all communication with the ships was from the Kentish side. Not only did it suffer by far the most heavily, but it was the first to be attacked. The next most heavily attacked was West Thurrock, which also happened to be the next nearest to the ships. No other explanation of these facts could be given, for in this case hospital operations could be ruled out. Dr. J. C. Thresh, M.O.H. for Essex, pointed out that all this had happened before, and that in the two previous epidemics since the ships had been used for smallpox Purfleet had suffered exceptionally. The distance from the ships to Purfleet was under three-quarters of a mile, but Dr. Thresh believed that the influence of the ships could be traced for a much greater distance to other parishes in the Union.

The Epidemiological Society Debate

In 1904 a full-dress debate on this question took place before the Epidemiological Society of London, when a paper supporting the theory of aerial convection was read by G. S. Buchanan, and many of the leading epidemiologists of the day took part in the discussion. Dr. C. B. Ker, Medical Superintendent of the Edinburgh City Hospital, who opened against the theory, said that he based his objection on his own negative experience at Edinburgh. There the smallpox hospital adjoined not only the fever hospital but the poor-houses and another institution, and there was a population of some 3,000 within the one-mile radius; yet, although for three months they had had an average of nearly 50 smallpox patients under treatment, there was no evidence of infection having spread from the hospital. He concluded that, while not denying the possibility of aerial convection, for practical purposes it might be disregarded. Dr. (afterwards Sir Arthur) Newsholme considered that the theory was not yet proved, and he waited for further confirmation. He thought that excessive prevalence round a smallpox hospital, when not due to coincidence, could be explained by personal contact; and as regards the Purfleet experience, he suggested that surreptitious visits by members of the hospital ships' staffs to the Essex shore might have taken place. (Dr. Buchanan in his reply said that the only instance of this discovered was the case of one man who had visited his sweetheart.) Analysing those who took part in the debate, we find that 12 were in favour of aerial convection and 7 against. Apparently expert opinion at that time was strongly in favour of the theory, and it is noteworthy that since then there has been no further opportunity of testing the theory, owing to the disappearance of epidemic smallpox from this country. In the presence of positive evidence, such as certainly exists from a number of different hospitals in different epidemics, negative evidence from other hospitals cannot settle the question. Innumerable instances have been recorded of failure to infect by personal contact (as where tramps in the early stages of smallpox have wandered about a town without infecting others), yet no one would suggest that this proves that smallpox is not infectious by personal contact. As regards aerial convection, we know little about the conditions necessary for the survival of the smallpox virus outside the human body, or of the meteorological conditions most favourable to this. It has been suggested that it may be related to the presence or absence of ozone, dampness, fog, etc., in the atmosphere.

To sum up, I feel that the case for aerial convection is very strong—much stronger, indeed, than many present-day sceptics imagine. I think that if they could spare time to consult the original reports they would admit this. At the same time it might be justifiable to allow certain hospitals to try isolating smallpox in general isolation hospitals and watch the result.

In the meanwhile, the theory of aerial convection does certainly provide a solution (and here I speak from personal experience) for remarkable facts in smallpox aetiology which cannot otherwise be explained.

CANCER RESEARCH

Prof. H. R. Dean, chairman of Council of the Imperial Cancer Research Fund, presided over the annual meeting of the Fund, which was held at the Royal College of Surgeons of England on April 19. Viscount Halifax was re-elected president of the Fund and Sir Holburt Waring treasurer. Mr. L. E. C. Norbury and Dr. C. H. Kellaway replace Mr. Sampson Handley and Prof. Major Greenwood on the Council as representatives respectively of the Royal College of Surgeons and the Royal Society.

In a brief account of the year's work Prof. Dean said that in cancer research progress was always slow, but during the last twenty years the rate of progress had been accelerated, and this was due partly to the fact that the observation of cancer as it occurred in human beings had been supplemented by the production of cancer experimentally in animals, but even so, the results of one experiment might need to be observed over a number of years, and every report of a research body such as their own must necessarily be of an interim character, recording investigations which might yet be long in reaching their conclusion.

Prostatic Cancer: Two Advances

What appeared to be the most important contribution of chemotherapy to cancer so far made was the administration of diethylstilbeostrol, the synthetic oestrogenic compound originally prepared at the Middlesex Hospital, in the treatment of cancer of the prostate gland. This work had the further interest that it was an example of treating gland cancer with a chemotherapeutic substance having the essential physiological properties of a natural hormone. As soon as this method of treatment was announced, Dr. E. S. Hornung, a member of the Fund's scientific staff, undertook to study the prostate gland in mice, and to attempt to induce glandular cancer by injecting a chemical carcinogen into the epithelium of the anterior lobe of the organ. In this he was successful, and six epithelial tumours were obtained out of fifty mice treated. This work had been continued by Dr. L. Dmochowski, a visiting research worker, and the chemically induced prostatic cancers had now been transplanted and were being studied.

Other Experimental Work

Two other research workers for the Fund, Dr. R. J. Ludford and Miss Hilda Barlow, had been investigating sarcomas arising in the stroma of transplanted breast cancers derived from inbred strains of mice, and had found that when spontaneous mammary cancers of these mice were propagated, each in mice of the strain in which the tumour arose, malignant transformation of tissue stroma was apt to occur. The sarcomas could be separated from the mammary cancers and propagated independently. An opportunity had thus been afforded for close study of these tumours *in vitro* as well as *in vivo*, and at all stages of their development. It confirmed that in some mammary cancers the malignant cell was able to induce malignancy in a neighbouring connective cell.

Another member of the Fund's scientific staff, Mr. H. G. Crabtree, had continued his search for a substance which would inhibit specific metabolic processes on the induction of cancer in mice. He had previously drawn attention to two substances—namely, the groups of compounds represented by chloro-acetone and by bromo-benzene respectively, which, though chemically unrelated, were intimately concerned with cancer metabolism, and to these he had now added a third—namely, maleic acid, used as the more fat-soluble maleic anhydride, which was proving even more effective than bromo-benzene as an inhibitor of carcinogenesis when applied in an appropriate

concentration. All the three classes of substances had the common property of fixing labile sulphydryl groups by three different types of chemical mechanism, all producing the biological effect of checking the action of chemical carcinogens. The inference was that sulphur, in an unknown way, was concerned in this type of cancer induction.

Nova et Vetera

HISTORY OF EPIDEMIOLOGICAL DOCTRINES

An English student of medical history reads in 1944 Dr. Charles Edward Amory Winslow's book, *The Conquest of Epidemic Disease** with a pleasure perhaps faintly tinged by envy and regret. He may not care much for the title; epidemic disease has not been conquered and the phrase gives no hint of the content of the work. But he will envy the admirably clear style of the writer and the way the book has been produced.

Dr. Winslow set himself the pleasant if laborious task of writing a history of opinion, choosing the authors whom he regarded as of primary importance and, so far as possible, letting them speak for themselves. This method easily degenerates into either a mere anthology with more or less relevant footnotes or into a catalogue of names. Dr. Winslow has avoided both mistakes, and, certainly so far as writers of the last 200 years are concerned, has fully succeeded. His study of Pettenkofer deserves particular praise. It is not easy to write sympathetically on a champion of a lost cause when one feels that, on the whole, the cause was deservedly lost; but Dr. Winslow has done so. One regrets that another champion of lost causes, who, like Pettenkofer, said many true and some profound things, Charles Creighton, is not commemorated in these pages. A special and rare merit of Dr. Winslow's exposition is its freedom from the vice of neocentricity—viz., the assumption that because a writer of the remote past taught something which resembles what we now believe to be true, *therefore* he must have been an exceptionally good reasoner. He may easily, of course, have been a very bad reasoner who guessed happily.

Contagion or Infection in Ancient Thought

Much of the first half of the book is devoted to an appraisement of the parts played by the concepts of contagion, or infection, and of atmospheric katastases, or constitutions, in the epidemiology of the Greek, Hellenistic, and mediaeval physicians. As Dr. Winslow remarks, few, probably no modern, physicians have mastered the whole of even Galen's writings; each of us must form a judgment on incomplete data. The reviewer certainly does not claim a wider knowledge than that of Dr. Winslow and his collaborator, Prof. Hendrickson, of the sources; but, having been an interested reader of Galen for many years, may attempt to supplement Dr. Winslow's discussion by epitomizing an argument published more than twenty years ago (*Proc. roy. Soc. Med.*, 1921, **14**, Sect. History of Med., p. 3).

Contagion or infection in ancient thought has two origins; from the pre-scientific idea of sympathetic magic and as a scientific corollary of the hypothesis of atmospheric change. The magical idea was wholly rejected by the Greek thinkers, but in many, perhaps a majority, of the passages in Latin poets and historians where the word "contagium" occurs that idea lurks. The notion of an atmospheric origin of disease, of a miasma spreading, is akin to that of transmitted vibrations, and at once suggests the analogy of tuning-forks picking up a pure note and transmitting it. Suppose the forks aligned, then the nearest to the original source of sound will first respond, and there is "infection" from one to another. I do not think that in any of the passages cited by Dr. Winslow, or in others which might be cited, Galen's idea of infection went beyond this. One inconsistency (see Dr. Winslow's book, p. 73, footnote) is explained by Prof. Hendrickson as due to a corrupt reading. There is another (see Greenwood, op. cit., p. 7) which does *seem* to postulate seeds of pestilence in Fracastor's sense; but the Greek text of the work has not survived. *If* this is a just analogy, the Greek scientific theory of contagion is merely of conduction; the tuning-forks originate nothing; so to Galen contagion was of secondary importance, he concentrated on the atmospheric katastases and the human crases. To Fracastor belongs the credit of imagining a fresh liberation of energy in each member of the series. Whether he conceived the process as chemical or biological is not, perhaps, a very important question. Had this hypothesis presented itself to Galen, the whole course of medical history would have been different.

* London: Oxford University Press. (30s.)

Influence of Galen

Dr. Winslow remarks that "it is a fundamental error to consider Galen as merely a compiler." One may be permitted to doubt whether a single reader of *any* tract by Galen (after all one of Galen's major works is available in the Loeb series) could have made that mistake. But no doubt Galen, like Malthus, is usually judged by people who have never read him. Dr. Winslow writes:

> "It is perhaps significant of the difference between the Greek and the Roman mind that Hippocrates is intrigued by problems of causation while Galen—Roman in environment if Greek by race—is almost exclusively preoccupied by the immediate practical problems of diagnosis and treatment. One is essentially a philosopher, the other an experimenter and clinician."

This judgment would have made Galen—two of whose most famous minor works are developments of the argument that a good physician must be a philosopher—very angry and, so far as epidemiology is concerned, is disputable. The most famous Hippocratic writings on epidemiology described observed facts, but Galen, as Littré said, although his opportunities of observing group-disease were far wider than Hippocrates', has left no detailed account of observations. One might easily support a conclusion the precise opposite of Dr. Winslow's and hold that the intellectual weakness of Galen—typical of the Hellenistic Greeks—was over-confidence in dialectic. Perhaps, however, Dr. Winslow had in mind *De Sanitate tuenda*, which might pass as a good practical work on personal hygiene, if the only human beings worth teaching were Roman plutocrats. Dr. Winslow does not give much space to Galen's Semitic followers. As the voluminous Avicenna is only available (except to those who can read Arabic) in dog Latin, this was inevitable, and we may fairly suppose that had an Arabic scholar found pearls of epidemiological wisdom in this large mass of oysters, they would have been displayed by now. One wonders whether Chaucer's "Doctor of Physik" *could* have read Avicenna all through!

Coming to modern times, Dr. Winslow's account of Kircher on contagium animatum may be instructive to others beside the reviewer, although it may not convince them that Kircher was quite first-rate. The chapter on the enigma of yellow fever tells us a good deal about Rush and Webster which will be new to English and, possibly, American readers. The remaining chapters cover ground which is familiar, although—as noted with respect to Pettenkofer—Dr. Winslow has judiciously used sources not tapped by most textbook writers.

Pioneers of Statistical Epidemiology

The reviewer—mindful of the cobbler's belief in leather—regrets that Farr plays but a small part and John Graunt no part at all in Dr. Winslow's drama, because he thinks that Graunt's contribution to epidemiology was immensely greater than Sydenham's. It was the London shopkeeper not the learned physician who really returned to Hippocrates as an epidemiologist, displaying essential facts with the help of a method, an organon, which the father of epidemiology might have envied. At least we can thank a countryman of Dr. Winslow for the only modern reprint of Graunt's book. Perhaps, encouraged by the success this book deserves, Dr. Winslow will tell the story of other forgotten pioneers of statistical epidemiology on both sides of the Atlantic. His book is escapist literature in the best sense of that adjective. It takes us out of ourselves and strengthens belief in intellectual progress through epochs almost as gloomy as that in which our own lot has been cast.

M. G.

HISTORY OF PHARMACY

Historical Survey of Pharmacy in Great Britain. By Carl Schmeidler, of C. R. Harker, Stagg, and Morgan, Ltd., Devon Wharf, Emmott Street, London, E.1. (Pp. 91.)

Next year will be the 600th anniversary of the opening in London of the first apothecary's shop of which there is historical record, and this little book therefore appears at an appropriate time. The author takes pains to show, quite rightly, that the choice and manufacture of drugs was an art which had developed through many centuries before 1345. Much is known of pharmacy in ancient civilizations, but in this country drug selling is first mentioned in the Pipe Rolls for 1180; in Italy there is evidence that such shops existed in 1140. In these early days the choice of drugs was bound up with astrology and superstition; the alchemical era was the last stage before pharmacy passed to its close partnership with the embryonic true sciences. The book traces the development of the trade through its association with the "Pepperers" and the East, and through its stormy controversies with the physicians after its emancipation as the Apothecaries Company in 1617. Although the *London Pharmacopoeia* was published in 1618, it was not until 1721 that ancient superstition was eliminated from its pages, and the first *British Pharmacopoeia* did not appear until 1858.

The history of pharmacy is a vast subject, and the author has had to choose his line of approach. He deals little with the history of individual drugs, and thus deprives himself of the opportunity of mentioning incidents such as that of the Lincolnshire grazier who in the space of twenty-one years swallowed 40,000 bottles of mixture and 226,934 pills—and finally had to be sued for the bill! There are a few errors: Newton was never an apprentice, but as a schoolboy he lodged with an apothecary named Clark. For the uninitiated a sharper distinction might have been drawn throughout between the apothecary and the druggist. But these are minor matters. The author set out to give a history of pharmacy *as a trade* in this country, and from this aspect and within his allotted space he has carried out his task sincerely and with considerable success.

Reports of Societies

GASTRO-ENTERITIS IN INFANTS

At a meeting of the Fever Group of the Society of Medical Officers of Health on March 31, with Dr. ANDREW TOPPING in the chair, a discussion on infantile gastro-enteritis was opened by Dr. REGINALD LIGHTWOOD.

Gastro-enteritis, he said, was not a disease *sui generis,* but could arise from enteral or parenteral causes. The latter had been stressed in recent years, but it was often difficult to decide whether a parenteral infection caused the enteritis or was secondary to it. Gastro-enteritis was one of the oldest scourges of infants in hospital, and in open-ward conditions high death rates had occurred, particularly so in medical wards, partly because the infection was always being reintroduced and partly because cases arising in the surgical wards were transferred to the medical side. The isolation unit for enteritis cases opened in the Hospital for Sick Children, Great Ormond Street, in 1938 had proved of inestimable value. Although certain facts about the aetiology of zymotic diarrhoea were well established (its virtual disappearance in countries where mothercraft was well taught and practised and its rarity in breast-fed infants) much was still to be learned. Some of the problems were: bacterial cause; the mode of infection in primary cases; the mode of spread; the need for separate cubicles for each case; the necessity for staff to wear masks; and the advisability of nursing parenteral cases near enteral cases. Dr. Lightwood had seen no response to sulphaguanidine, but sulphadiazine and sulphamezathine appeared equally effective for any parenteral infections present. He favoured 5% glucose in half strength Hartmann's solution for intravenous fluid therapy, and recent experience with plasma or serum (diluted with equal parts of the above solution) had given encouraging responses after the initial dehydration had been combated—i.e., after six to twelve hours. Mastoidectomy had been performed in 9 cases during the last nine months, 5 being fatal, due, he thought, to the debilitated and toxic condition of the child at the time. The operation could be done under local anaesthesia without much apparent disturbance to the general condition of the infant.

Dr. L. J. M. LAURENT said that infantile diarrhoeas were usually classified in three groups: (1) non-infective (mostly dietetic in origin); (2) symptomatic (due to a parenteral infection); (3) infectious, of primary gastro-intestinal origin. But in practice it was often impossible to assign an individual case to its proper group without a week's observation. The mild diarrhoea occasionally seen in the measles or whooping-cough wards at first sight seemed to be of dietetic origin; but the condition often spread in series of cases, and he suspected that the majority were infective. Under "symptomatic diarrhoeas" due to a parenteral infection at all ages should be included the diarrhoeas of puerperal septicaemia, early typhoid, cerebro-spinal fever, toxic scarlet fever, and severe otitis media and broncho-pneumonia in infants. With suitable treatment improvement was usually rapid, though symptoms like dehydration often needed correction. The infectious diarrhoeas of primary gastro-intestinal origin fell naturally into two groups: (*a*) those of known aetiology—namely, the dysenteries, the enterica, and the salmonellas; (*b*) those of unknown aetiology, which were a baffling problem. The wide differences in case fatality for gastro-enteritis given by different hospitals (7% up to 53%) could not be explained by age, season, and lines of treatment. He thought at least two diseases were concerned, which he designated Type A and Type B.

In Type A an incubation period, usually of three days, was followed by sudden onset with pyrexia and vomiting, some cases not having diarrhoea for 24 hours. From the start rate of breathing was high and there was a short cough. Many patients were admitted to general hospitals as cases of bronchitis and were later transferred to the fever hospital when the diarrhoea appeared. The stools were watery, bright green or orange in colour, and had a musty, not faecal, odour which some nurses thought characteristic. Dehydration was early and profound, and toxaemia was present. Vomiting was intractable and preceded by a troublesome short cough. On the fifth or sixth day, rarely before, the temperature went higher, and with this there was unmistakable evidence of otitis media or bronchopneumonia, or of both. Death occurred in 40 to 50% of the cases and was preceded by coffee-ground vomit, hyperpyrexia, and often convulsions. Necropsy showed fatty degeneration of the liver in all, patchy congestion of the intestinal mucosa, and a few pinpoint ulcers. Pus in the middle ear was common (23 out of 32) and also bronchopneumonia (13 out of 32). He considered the otitis media and the bronchopneumonia to be secondary infections and not causes of the diarrhoea and vomiting. He had tried paracentesis years ago, but all his cases had been ultimately fatal and had showed no improvement after the operation. *H. influenzae* or pneumococci had been found on plating straight from the paracentesis knife at the bedside. Type A behaved like an acute specific infection which affected both the respiratory and the alimentary tracts, giving rise to a fatal toxaemia (or septicaemia) with frequent secondary infection of the middle ear and lungs. Clinically its spread resembled that of a virus droplet infection.

Type B was a much milder disease with an incubation period of 8 to 10 days. The onset was more gradual, with diarrhoea, vomiting, and pyrexia. Stools were more often relaxed than watery. Dehydration was in proportion to the fluid lost, and if corrected did not tend to recur. The cases were often not admitted to hospital for a whole week. There was no otitis or broncho-pneumonia as early as the fifth or sixth day; the mortality in hospital cases was less than 10%. The disease behaved like a primary "enteral" infection, and it was probably this type which could be safely nursed in a "barrier" ward. The stools showed a variety of organisms of doubtful pathogenicity, but dysentery organisms were not found.

Faced with different types of infantile gastro-enteritis of different aetiologies and methods of spread the medical officer of a fever hospital had no choice but to isolate every case in a separate room. The barrier ward had become obsolete in the treatment of gastro-enteritis. In addition, a sufficient number of well-trained nurses was needed, the ratio of nurses to patients being higher than in any other ward.

Mr. E. F. GALE said that a group of workers at Cambridge had found large numbers of β haemolytic Group D streptococci as a "feature" of the stools in certain outbreaks of neonatal diarrhoea. These organisms had (1) an unusually

high tyrosine decarboxylase activity, and (2) the power to establish themselves in the faecal flora of the infant rat or man, properties not possessed by normal enterococci. Feeding these organisms to infant rats resulted in a fatal diarrhoea which was most marked when the diet was such as to render the intestinal medium optimal for the action of tyrosine decarboxylase; and the syndrome could be imitated by feeding tyramine itself. Older rats were not susceptible to the action of either the organisms or the amine. Estimations of the tyramine oxidase activity of fresh post-mortem material from infants showed that this activity was deficient at birth in the kidney, liver, and duodenum, but was fully developed by the end of the third month.

Dr. R. SWYER said the diagnostic error among enteritis admissions was high. Mastoiditis could arise as a late complication, but some of these cases were due to hospital infections: this view was supported by finding haemolytic streptococci in a high proportion. Dr. H. S. BANKS said that before the war the paracolon group of organisms appeared to have some place in aetiology. He felt that experiments on young animals (up to three weeks of age) were indicated. Dr. T. E. D. BEAVAN argued strongly for *ad hoc* gastro-enteritis units in children's hospitals. One of the problems of the disease was the comparative immunity of children from 12 months to 2 years and the absolute immunity thereafter. Infants with minor ailments, particularly skin diseases, should not be admitted to hospital because of the high risk of enteritis. He agreed that in the presumed infective group of unknown aetiology there were two distinct types. The odour of a severe case could best be described as spermatic. Dr. JANET GIMSON, while stressing the need for parenteral fluid therapy, said that the intravenous route in infants was often difficult for inexperienced medical officers. She favoured bone-marrow transfusions because they were simpler to institute and could be maintained at a constant rate more easily than intravenous drips. She demonstrated a short needle with a strut-supported adaptor suitable for marrow transfusions in infants as it was not easily displaced. Dr. J. BRAY wondered if Mr. Gale had done animal-feeding experiments with amines, and pointed out that a number of organisms which were normally present were greatly increased in the presence of enteritis. In reply, Mr. GALE said that young rats (up to ten days) did develop diarrhoea when fed on tyramine. He had never met a coliform organism which produced an amine in significant quantity.

MUSCULAR FACTORS IN FOOT FAULTS

At a meeting of the Manchester Medical Society on April 12 Mr. W. SAYLE CREER gave a lecture, which was illustrated with a cinematograph film in colour, on some foot faults related to form and function. He said that many patients complained of aching in their legs, and while some of them had foot deformities others had no obvious defect to explain the symptoms. The aching was due to muscle fatigue, which was caused by muscle overwork, and the reason for this overwork was as follows. In the normal foot unit, which meant all the tarsal bones below the astragalus, or talus, the inherent strength and shape was such that the foot was in stable equilibrium with the ground. A very common defect was an incompetent first metatarsal. This phrase meant a failure of the supporting action of the first metatarsal due to a hypermobile first metatarsal and internal cuneiform, a permanently elevated metatarsal, or a short first metatarsal. As in the case of a three-legged stool with a defective leg, the foot fell over to the inner side; Americans called the condition "pronation." The joint at which the movement took place was between the astragalus and foot unit, and in order to balance the foot the patient had to use the muscles excessively. This pronation, which was not by any means the same thing as the rare flat-foot, was the common deformity found in children and in quite a number of adults.

Other causes of muscular fatigue were factors which altered the relative tonus of opposing groups. Any painful condition of the foot—such as a corn, a wart, a callosity, or projecting nail in the shoe, or shoes which were too tight—would, by its reflex effect, diminish the tone of one group in an effort to prevent pain, and consequently increase the tonus of the opposing group. This led to incoordination and symptoms of muscle strain. There were many factors outside the foot—such as tightness of the tendo Achillis, "squinting" knees or internal rotation deformity of the femora, tight hamstrings, excessive lordosis with its associated flexion of the hip-joint—which affected the work that various groups of muscles had to perform.

In examining the foot, small deviations from the normal had to be looked for, for the foot was a small object and deformities were very often anything but gross and obvious. In the majority of cases it was not necessary to carry out elaborate surgical procedures; the patient could be made comfortable by suitably altered footwear and the right kind of physiotherapy. The commonest type of surgical alteration to footwear was wedging the inner border of the heel and the outer border of the sole. The older method of wedging the inner border of the sole was not mechanically and physiologically sound and not so effective. The surgeon must take great care to impress upon the patient the necessity for keeping the shoes in good repair, for badly wedged or worn shoes "wobbled" and gave rise to additional muscle fatigue so that the symptoms were not relieved.

The annual congress of the Ophthalmological Society of the United Kingdom was held in London at the R.S.M. on March 31 and April 1. Among the visitors were ophthalmic surgeons of the American armed Forces. The president, Dr. H. M. TRAQUAIR, after welcoming members and visitors, gave his presidential address on "The Nerve-fibre Bundle Defect." It was a valuable and enjoyable congress, and many of the papers gave rise to interested discussion and comment. All the proceedings, together with a report of the joint clinical meeting, will appear in the *Transactions* of the Ophthalmological Society of the United Kingdom for 1944.

The Whipps Cross Hospital Medical Society held its first public meeting on April 14 when Mr. D. G. Ardley gave a lecture on the chemotherapy of bacterial infections. There was a good attendance of local practitioners. The next meeting, which will be clinical, will take place at the hospital on Friday, May 12, at 8.15 p.m. Practitioners who wish to show cases should notify the honorary secretary of their intention at least 14 days beforehand.

Medico-Legal

CONTINUOUS CARE AND TREATMENT

Abundance of caution was probably responsible for most of the defects of "Herbert's Act"—the Matrimonial Causes Act, 1937. Among other grounds the Act allows a party to a marriage to be granted a decree of divorce on proof that the other party is incurably of unsound mind and has been continuously under care and treatment for at least five years immediately before the date of the petition. The definition of "under care and treatment" has already caused difficulty, and recently has been shown to conflict seriously with the best-accepted treatment of persons of unsound mind. The usual form of care and treatment under the Act is detention in pursuance of any order or inquisition under the Lunacy and Mental Treatment Acts. As the care and treatment must be continuous, if the continuity of the detention has been broken in any way the petitioner cannot have his/her divorce. In Shipman *v.* Shipman (1939) the wife had been sent out every year for a long period between Christmas and the spring to live with her sister; the President held that absence on trial for prolonged and indefinite periods must be on the wrong side of any reasonably drawn line between continuous and interrupted detention. In Green *v.* Green (1939) the husband was sent for a fortnight to a house belonging to the Mental After-Care Association; he was under the charge of the association's officers as agents for the local authority maintaining the hospital from which he came. The President did not think the detention was interrupted. The most recent case,

however, Safford *v.* Safford (1944)[1] turned on the question whether release on trial interrupts the detention or not. The husband was sent out twice in the summer of 1942—for fifteen days and forty-four days—and between the two periods he was back in hospital for a week. The orders were made by visitors on the advice of the medical officer, according to the Lunacy Act. On behalf of the Official Solicitor it was indicated that the Board of Control would greatly welcome in the interests of patients a decision which would, without incurring the risk of defeating the inchoate rights of petitioning spouses, encourage the use of release on trial, which medical superintendents regard as very beneficial in favourable cases, and as tending at least to alleviate the tedium of detention. Counsel on both sides invited the President to hold that the detention was continuous, but Lord Merriman regretfully decided that he could not do so. None of the relevant Acts defines the word "detained," and he felt bound to assume that if Parliament had intended the mere existence in force of a reception order to be sufficient, it would have said so. Except for daytime absences and the leave of absence for three nights or four days which a superintendent may grant under the regulations, which may be disregarded under the *de minimis* principle, there must be something which can be described as continuous detention in the mental institution itself, or something that may fairly be regarded as its equivalent. He could not bring himself to hold that absence on trial for substantial periods satisfies those requirements.

On the wording of the Act it is difficult to imagine how the President could have held otherwise. In the Scottish Act, which was passed a year later, the position is different, for that Act expressly provides that a person is "under care and treatment" while an order for his detention is in force, and when he is absent from the mental hospital the order remains in force, and detention therefore persists, for 28 days. Hence, if the patient's leave of absence is kept within that period, no question arises. Of the many amendments which the English Act requires, this seems to be the most urgent.

MENTAL HEALTH LEGISLATION IN SOUTH AFRICA

During the current sessions of the Union of South Africa House of Assembly legislative changes of a revolutionary kind have been made in the Mental Disorders Act of 1916, which is now amended so that the superintendent of a mental institution can no longer be compelled to retain anybody brought there at the request of any policeman. The amendments also empower judges and magistrates to commit accused persons suspected of suffering from mental disorder directly to a mental institution for observation, instead of ordering them to be held in a prison to await the Governor-General's decision. Provision is also made for the admission, for a period not exceeding twelve months, of persons suffering from apparently curable mental disablement as voluntary patients, the cardinal object being that no court order of certification is necessary. The commissioner of the institution has the power to discharge such patients at his discretion, and either the patient or next of kin has the right to apply for immediate release on conditions such as prevail in this country.

In the debate the Minister of Welfare and Demobilization, Mr. H. G. Lawrence, refused to accept an amendment absolving relatives or guardians of mental patients from paying for their maintenance. The Minister said that the Government had difficulty in accommodating patients, the present shortage being about 400 beds for Europeans and 2,500 for non-Europeans.

1 *Times*, March 14.

The National Union of Students (3, King's Parade, Cambridge), the representative body of students in 103 universities, university colleges, technical and training colleges in England and Wales, is at present working on student health problems in co-operation with the Scottish National Union of Students, the British Medical Students' Association, and the British Dental Students' Association. It has been concerned with this problem for some time, its activities having included the publication of a report on student health in 1937, and the encouragement of a scheme to establish an international student sanatorium. The war made impossible the immediate implementation of long-term proposals. Therefore an interim programme is being put forward which aims to keep students fit enough to meet their present responsibilities and to use fully and improve existing services in such a manner as to pave the way for a more thorough reconstruction after the war.

Correspondence

Publication of Anaesthetic Misadventures

SIR,—Dr. John Elam has campaigned persistently for safer anaesthesia. His latest suggestion on page 263 of your issue of Feb. 19 is one of the brightest ideas I have yet heard of for reducing the incidence of anaesthetic misadventures, major and minor. If put into practice it would indeed be effective, but in its present form it pre-supposes exceptional honesty on the part of the anaesthetist, and a considerable increase in the size of your *Journal* if it is to be the medium of confession. Before making a proposal as to how Elam's suggestion might be modified, I give my own full list of misadventures, three in all, in the belief that published evidence of this nature, if accumulated, would be of value to younger anaesthetists. I exclude a case of amputation for gangrene in an elderly woman already unconscious and moribund when brought to operation as a last desperate resort.

1. Overdose of anaesthetic. Many years ago an adult man died during a minor operation. At necropsy the sympathetic pathologist stressed a fatty heart and liver. At the inquest I was even commended on how I had dealt with the situation. Only I knew that that patient had died from my "pushing" the anaesthetic to subdue the patient's reflexes quickly. This death was due to bad anaesthesia, and yet is probably listed for statistical purposes as "fatty degeneration of the heart."

2. Mental deterioration following nitrous oxide. Anaesthesia was induced and maintained with nitrous oxide, but the operation did not commence for almost an hour owing to the surgeon's encountering unexpected difficulties with the previous case. On recovery the patient was restless, irritable, and irrational, as described by de Courville in his book *The Untoward Effects of Nitrous Oxide*. The patient died on the fourth day from pulmonary collapse. Necropsy was refused. I have no doubt that the sequence of events was attributable to prolonged anoxia due to a misuse of nitrous oxide.

3. Amputation of forearm resulting from pentothal injected inadvertently into an artery. This case was published in the *Lancet* of Nov. 6, 1943, page 571.

The pages of the medical journals testify that anaesthetists, like other mortals, rush into print more readily with their successes than with their tragedies—yet it is from the latter that more can be learnt. Anaesthetic misadventures are not rare. The accidents I have heard of recently varied considerably in character. One can well imagine the mortification of giving pentothal intra-arterially on two different occasions, each followed by amputation; the paralysing effect of injecting the wrong drug intrathecally; the tragedy of leaving the anaesthetized patient unattended for a short period to find him dead on return; of having been responsible for an explosion through ignorance of elementary physical facts; of giving chloroform under the impression that the bottle contained ether; of giving a lethal overdose of pentothal, or of local anaesthetic drugs such as cocaine and amethocaine. The cause of tragedies such as these is obvious; others are not so overt. Death on the table is a clinical problem, and in the great majority of cases the anaesthetist is the only one who can give a clue as to what went wrong; if he is frank enough to give a detailed anaesthetic history of the sequence of events prior to death his story will be far more illuminating than the most searching necropsy.

A striking fact is that anaesthetists seldom make the same mistake twice. Who has heard, for example, of the anaesthetist who has had two deaths from so-called status lymphaticus? He may make many mistakes once. This is because he has perforce to learn in the hard school of his own experience, since the misfortunes of others are not readily available to him. This can be remedied. The publication of anaesthetic misadventures in a form in which the victims can be identified by the lay public is obviously undesirable. I think, however, they could be collected and published in book form from time to time. To avoid social or legal repercussions it might be desirable to confer anonymity on the anaesthetist. The Association of Anaesthetists is now a large and powerful body. A Misadventure Subcommittee might be formed to which fellows and members could bind themselves to notify their misadventures. There would soon be available valuable

reference books of what not to do. Alternatively, an investigation on these lines might be undertaken by some scientific or philanthropic body with adequate funds at its disposal. Such an investigation would pay a good dividend in terms of human life.—I am, etc.,

Oxford. R. R. MACINTOSH.

The Hazard of Anaesthesia

SIR,—Much has been written recently in your columns concerning risks attached to the various methods of anaesthesia; in fact, it is rare to pick up a *Journal* without finding an illustration of some new piece of apparatus which is claimed to be of value to the anaesthetist. This seems to me to be making a simple subject into a complicated art, and no wonder that the average R.M.O. cannot be expected to administer anaesthetics with skill when he is called upon to use this massive armamentarium.

I have been giving anaesthetics in different hospitals since 1921, and have tried all the various new agents, such as cyclopropane, spinals, CO_2 absorber, etc., and at last have come back to where I started—open ether, allowing myself plenty of time for the patient's respiratory tract to get used to the irritation of ether vapour, about 8 minutes. The average R.M.O. will have to learn to give anaesthetics himself, as there will not be enough anaesthetists to go round when the second front opens. In fact, under Service conditions one often has to rely upon the assistance of a sensible sister or nurse.

I maintain that open ether given slowly, and if the anaesthetist refuses to be hurried by the surgeon, is as safe as anything can be in medicine. Perhaps there is only one exception, and that is in thoracic surgery, where movement of the lungs has to be controlled; but as most thoracic surgery is best left to specialized units a skilled anaesthetist in this work will be available. To sum up, care, calmness, a good airway, and open ether represent the art of anaesthesia to-day.—I am, etc.,

Bebington, Wirral. J. M. H. HANNAN.

What is Psychiatry?

SIR,—In view of the considerable amount of painstaking microscopic research which has been devoted, in many parts of the world, to the study of brain cortical cells in normal and abnormal mental conditions, it is a little disconcerting to find so influential an authority as the Director of the Medical Services Division of the Rockefeller Foundation committing himself to the statement, for which he produces no evidence, that there remains a much more difficult group of (psychiatric) diseases in which *no structural or chemical variation* is known to accompany in characteristic fashion the all-too-obvious symptoms of social, moral, and intellectual inadequacy (April 22, p. 551).

In the works of Shaw Bolton, G. A. Watson, Bournville, Hammarberg, Sachs, von Economo, Vint, R. M. Norman, and many others, including even my own *Cerebral Atlas*, there is much evidence to refute Dr. Alan Gregg's hypothesis; but perhaps, as much of this is derived from the mental defective, Dr. Gregg wishes it to be inferred that the brain cells of the psychoneurotics are immune from the structural and pathological abnormalities of the lesser breeds of men. Some of the surplus wealth of the Rockefeller Foundation might perhaps be devoted to the elucidation of the truth.—I am, etc.,

Ormskirk, Lancs. RICHARD J. A. BERRY.

Ophthalmic Surgeon and Optician

SIR,—The article in the *Journal* of April 22 (p. 560) by Mr. Spencer Walker on the future of ophthalmic work makes me, as one of the members of the Ophthalmic Group Committee, send you some reply. I think I may say that this committee has been for many months past carefully considering the future of medical eye work: work involving ophthalmic medical practitioners, nurses, optician-refractionists, and dispensing opticians; workers of such order as will inevitably be necessary if the new National Health Service establishes regional health centres for certain medical attention, of which, without doubt, eye work would be one form of service. Such centres may be attached to hospitals preferably. The Ophthalmic Group Committee has drawn up an excellent draft of a scheme for the future. That draft is before all members now. Such a scheme will doubtless involve the National Eye Service as at present working under the direction of the National Ophthalmic Treatment Board, of which I am chairman.

Personally, I think that the work of the National Eye Service has been uncommonly successful and useful. The B.M.A. and the Dispensing Opticians Guild started this service at the request of the special committee appointed by Parliament to consider the claim of the sight-testing opticians presented to Parliament in a Bill laid before the House of Commons. That special committee emphasized the importance of trained medical eye experts, and every item of experience I have had as chairman of this Board has confirmed this.

The work of our National Eye Service has been especially useful when run in clinics. The value of the service is perhaps best shown by the way it filled a serious gap in the Government medical provisions at the outset of this war. The service was of particular use in that catastrophic time. When war threatened an officer of the War Office asked if the Army might make use of the N.O.T.B. organization for the care of the "file" of the Army. On my own responsibility, as chairman of the Board, I replied it could. The work the N.O.T.B. has done for the Army and Air Force since then, and particularly in the early years, has been immense. I wish I could display the figures that I have here before me, with the numbers of the soldiers attended by the N.O.T.B.; I think that would be a surprise to colleagues. But let it be noted that the facility given by the N.O.T.B. organization has justified itself in one respect: the number of recruits referred for eye examination, I have been informed, has exceeded considerably the number referred for all other medical and surgical defects! That fact, shown in the early years of the war, indicates how important are satisfactory arrangements for eye examination, eye care, and eye treatment. There is no doubt that some national and regional eye service for all who do not wish to make their own arrangements will be of high value to our fellow citizens.—I am, etc.,

Crockham Hill. N. BISHOP HARMAN.

SIR,—The White Paper states that the design of the National Health Service shall be comprehensive from the outset, and be fulfilled as fast as resources and man-power allow. Some temporary limitations of the full service in ophthalmology are expected to be inevitable. During the period of negotiation ahead of us it is the duty of all ophthalmologists to take an active part and endeavour by constructive criticism to find a solution of the problem of laying the foundation-stone of a sound and comprehensive ophthalmic service for the whole community.

In your issue of April 22 Mr. Spencer Walker of Hove submits a solution which, as he says, is similar to my plan, which I have been urging on the profession for a considerable time. He came to his conclusions independently of me, and I have known for some while that there is a large body of opinion among ophthalmologists in support of our views. The Ophthalmic Group Committee has adopted the plan and it is submitted to the profession for approval. It is for this reason that I write to support Mr. Spencer Walker. I know of individual sight-testing opticians who will welcome the scheme, but we do not know what will be their opinion as a whole.

The main argument of ophthalmic surgeons opposed to the scheme is that opticians should not be allowed to do refractions and examine eyes. There is little need to say much to refute this, as most surgeons are fully aware that the optician can do refraction as well as the surgeon. What he cannot do is assess the importance of the error of refraction in the life of the patient, and this brings me to the main argument against the scheme among opticians. They assert that they should have professional status and be independent of medical control. This is clearly impossible, as the ophthalmic surgeon must be the one responsible for the welfare of the eyes of the community, and if he is to be responsible he must have control.

But why must the ophthalmologist be entirely responsible? For two very good reasons. The first is the diagnosis of early disease. It is true that the optician can in a large number of

cases recognize the presence of a disease or an abnormal condition, but there is that percentage of patients in which a pathological condition is overlooked. Even if the percentage of such cases is as low as 1 or 2, that is too many. The training of the optician in the pathology of the eye is quite inadequate, and short of a complete medical training must always be dangerously incomplete.

The second and more cogent reason is the assessment of the importance of a refractive error in each individual case. It is only the ophthalmic surgeon with his medical training who is able to decide whether an error of refraction requires correction, or whether other treatment, either locally or generally, is advisable. It is a common experience to see patients who have been supplied with glasses by an optician and in whom there is found some other and more important cause of their symptoms.—I am, etc.,

Ryde. FRANK HECKFORD.

SIR,—There is much to be said in favour of Mr. Spencer Walker's article on the ophthalmic surgeon and the optician. It has always seemed wrong to me that even the most enlightened ophthalmologists should have to spend much valuable time in prescribing presbyopic spectacles in order to live. There can be no objection to the handing over of the refractions to a sight-testing optician or medical auxiliary provided the patient has been first examined by a doctor and all question of disease eliminated. I believe that such a scheme obtains at the present time in the Royal Naval Medical Service, where opticians come into the category of Sick-berth Steward O.

But even if the opticians are willing to co-operate in such a scheme—and recent correspondence in the Press suggests that some of them at any rate regard themselves rather as consultants than as medical auxiliaries—there still remains the question of finance. From our point of view this may be rather a "bull" than a "bear" point. I do not know what the average sight-testing optician earns, but I should think his income is high, having regard to the price of spectacles and the fact that all classes, irrespective of their financial status, seem willing to buy elaborate spectacles. It is possible, therefore, that an optician may earn more than the State proposes to pay an ophthalmic surgeon, though this is mere conjecture, as, with customary delicacy, this all-important point has been omitted from the White Paper. Now, while we as a profession are notoriously unbusinesslike and take an altruistic view, no one would accuse the opticians of any lack of business acumen. The Minister of Health can hardly offer a higher salary to a medical auxiliary than he suggests for a doctor. I am sorry to finish in such a materialistic vein, but anyone who has read Sir John Anderson's admirable Budget speech will realize that inflation has already set in, and I do not wish to end my career on an inadequate fixed income.—I am, etc.,

Camberley. LESLIE HARTLEY.

What is Evidence?

SIR,—I was very sorry to see the article "Assessment of Blood-group Evidence" in the *Journal* of Jan. 22. Even had such an article appeared in a legal journal I should have found it remarkable, but finding it in a journal of medicine is almost beyond belief. For a writer presumably familiar with the reliability of blood-grouping tests and the unreliability of the testimony of witnesses and of subjective judgments of character, to indicate approval of Mr. Mullins in coming to his decision that "he did not, having heard and seen the wife, think she was of a type that commits adultery," frankly amazes me. Your writer goes on to say, "It would be an evil day for our courts if they ever felt obliged to elevate scientific evidence into a class by itself, instead of, as at present, keeping it on the same footing as other evidence." Had your writer said instead, "It would be an evil day for our courts if they ever felt obliged to base their decisions on facts instead of rumours and anonymous communications," I could not have been more astonished. At one stroke you have dealt the cause of the proper use of scientific proof a blow from which it may require literally years, not only in Great Britain but also in the United States, to recover.—I am, etc.,

Boston University, School of Medicine, Boston, Massachusetts. WILLIAM C. BOYD.

To Boil or Not to Boil

SIR,—Within the last seven months two samples of milk, as supplied compulsorily to residents in a road, have been sent for bacteriological analysis to the Ministry of Health laboratory in the district. Necropsies of inoculated guinea-pigs gave one sample positive for *B. tuberculosis*, the other for *Brucella abortus*. In the fourteen houses in this small road section, supplied by the one vendor, are living fourteen young children. No alternative milk supply is purchasable, yet public advice to make the milk safe by boiling is not thought desirable. The M.O.H. has been consulted, but replies that "we public health people" consider that general advice to boil milk should be reserved in case a typhoid or other epidemic should make such recommendation a matter of extreme urgency.

So fourteen young children, in homes where extremely high standards of child care are maintained, are left unprotected by the guardians of public health, although the milk supply is demonstrably toxic. The two households who submitted the samples for analysis were "strongly advised" to boil all milk, but this warning would only directly affect two of the fourteen children. Very many others in the area supplied from the same source must also be at risk. If a pasteurized supply is impossible to obtain while the war lasts should not purchasers be warned that milk safety cannot be guaranteed, and that milk should therefore be brought to the boil before allowing children to consume it?—I am, etc.,

ESTHER CARLING.

Mastoiditis and Mastoidectomy

SIR,—I am very glad of Mr. G. Gordon Mowat's reply (April 8) to my letter on mastoiditis (March 18) because, as he generously states, I do write in very good faith. I feel that this is a very vital question for the medical profession and should be widely ventilated.

The word "mastoid" brings a feeling of dread to the general public. They of course do not look upon it as a very strong bone protecting the ear and giving a point of support to important muscles of the neck. The public have come to think of it as a dread new disease which requires an operation of a very serious and often fatal nature, with frequent great disfiguration and possible facial paralysis, possible deafness, a continuation of and aggravation of the ear discharge with very painful and prolonged dressings after operation.

The operation of mastoidectomy, I believe, originated in Germany and has been performed in this country for roughly the past forty years. The operation became very popular with otologists from about 1910 onwards, and, I contend, became quite a menace to the public. After the last war its popularity came to its full swing. For several years the cry was for immediate operation. This naturally was followed by a great many tragic deaths of healthy people, mostly children and young adults. To break into the mastoid bone, get into an acutely infected middle ear, and then (as was so often done) to chisel away into the attic and remove the bone which separated this septic cavity from the brain was, in my opinion, very faulty surgical technique, and simply asking for trouble.

The frequency of meningitis was alarming, and so many young people died of this in a matter of three or four days to a week after the mastoid operation that it began to alarm otologists. A wiser attitude prevailed, and the practice of waiting until the acute stage of the otitis media had passed became the general rule. Nevertheless, even this wiser policy got a very bad hearing when Dr. Douglas Guthrie of Edinburgh first proposed it at a meeting of the Otological Society in London some years ago. Now, I am glad to say, his words have sunk in, and, I repeat, it is now generally accepted that it is extremely dangerous to operate upon an acutely infected middle ear. By operation I do not mean paracentesis of the tympanic membrane, for that, I contend, is a proper course to take, and is just assisting Nature rather than waiting until the tympanic membrane ruptures, and it is a proper surgical technique. "Where there is pus, let it out."

Redness and swelling behind the ear, with the ear pushed forward, and a raised temperature, etc., is no reason for mastoid operation. The infection has not passed through the mastoid bone. It would be ridiculous to think that it could do so

in this hard powerful bone in the space of a day or two, as was contended by those who believed that osteitis of the mastoid bone had taken place. The infection passes along the meatus and infiltrates into the tissues at the back of the ear, causing those so-called symptoms warranting mastoidectomy. This is proved by the great frequency of all those symptoms in furunculosis of the auditory meatus. I have seen similar symptoms after a boxer has received a hard blow over the ear. I have seen similar symptoms in a child with pediculosis capitis, which caused scratching and inflammation of the scalp.

I cannot believe that Mr. Gordon Mowat really means that all cases with a discharge from the middle ear should be subjected to the drastic course of having a mastoid operation performed within six weeks of the commencement of the discharge. How soon would he operate? What mass operation there would be; for a discharging ear has happened to a great many people at some time of their lives. Even furuncle in the ear often takes weeks to clear up, let alone an otorrhoea, Mastoidectomy is a very drastic way of stopping a discharge from the ear, and, alas, it so frequently does not succeed. Personally I would rather have a discharging ear than undergo mastoidectomy, and I know of many more who also would think it the lesser of two evils. However, as Mr. Gordon Mowat says, the symptoms do subside, the discharge does dry up, and very often the perforation itself heals also (the last is my own remark, the first two are Mr. Mowat's), and I simply cannot agree that a state of mastoiditis or osteitis of the mastoid bone remains. So why operate? The danger of meningitis or of abscess of the brain is immeasurably greater when the defences are all chiselled away than when, at the worst, the mucous membrane lining of the middle ear is thickened, the discharge is of a chronic non-virulent nature, and Nature herself has sealed off all sources of danger. This is what does happen and always has happened, and it results in a very harmless state of affairs for the patient.

The only cases of meningitis and of abscess of the brain I have seen as a sequel to otitis media have been those on which mastoidectomy has been performed. Cases of previous radical or modified radical operation are placed in Grade IV. This is very definite, and shows what medical authority thinks of the expectation of life or of health of anyone who has undergone the mastoid operation.

The alternative to the mastoid operation is treatment of a very simple nature:

(1) First drop pure hydrogen peroxide into the affected ear; gently mop up secretion; do this several times until the meatus is as clear as possible. (2) Rest patient on affected side and apply as much heat to that side of the ear as possible. (3) It is generally best to give an aspirin or phenacetin powder twice daily to help the inflamed pharynx which originated the ear trouble; it is also soothing and helps to allay pain and allow sleep. (4) Great pain is nearly always stopped by dropping in pure methylated spirits, followed quickly, if the spirit itself causes too much of a feeling of burning in young children, by pouring in pure hydrogen peroxide after letting the spirit run out of the ear. (5) As the discharge becomes less, add one or two drachms of spir. vini meth. to one ounce of hydrogen peroxide and continue using this as ear-drops for some time. (6) Latterly use pure methylated spirit to complete the drying up and healing process; continue this for many weeks, filling the ear with spirit nightly and plugging with cotton-wool; the wool can be removed in the morning. (7) Sometimes, for a cellulitis behind the ear or irritation of the skin of the ear, 10% ichthyol in glycerin on plain lint is required, and quickly allays inflammation and tenderness

The general medical practitioner needs only patience, faith, and courage, and he will see results which will astound him.—I am, etc.,

Edinburgh. H. HILTON BROWN, M.B., D.P.H.

Marriage and Parenthood

SIR,—Dr. E. F. Griffith's letter (April 15, p. 540) raises issues of paramount social importance at the present time, not only because there has never been a period as during the last five years when so many young and ignorant couples have rushed blindly into matrimony without the foggiest notion of its complexities, but also because many of the difficulties he outlines will be multiplied and accentuated when the fighting men return to their womenfolk on demobilization. His letter is, in point of fact, an amplification of Prof. J. A. Ryle's letter in the *Lancet* of March 27, 1943. Both Prof. Ryle and Dr. Griffith tend to suggest that doctors are in great part to blame for the ignorance of the public, but I think this is hardly fair. My experience has been that people will ask their next-door neighbours or their friends or the chemist about these matters, any one in fact but the only person whose knowledge is sufficiently thorough to explain things properly—namely, the doctor.

Dr. Griffith states that young people should be encouraged to seek advice. So they should, but many difficulties will be encountered. Those who try will find that it is well-nigh impossible to cleave a way through the jungle of ignorance and prudery which surrounds the vast bulk of the population. It may sound incredible, but my experience goes to show that there are people who are actually prepared to believe that efforts to assist them spring not from a disinterested desire to spread the light of truth but from a spirit of wanton and vulgar curiosity. I have even encountered a spirit of narrow-minded censoriousness in people who by their education and training should know better, and it is not until a high level of intelligence, coupled with a sound though non-medical education, is reached that one finds even a disposition to regard such matters with a reasonable degree of broad-mindedness. The education authorities are the prime culprits in respect of the public ignorance of sex, and not until they lay a satisfactory groundwork of sane sex education can any progress be made which will enable doctors to exercise their specific educative function.

Dr. Griffith and Prof. Ryle are pioneers, and like all pioneers are a generation ahead of their time. Their voices, I am afraid, stand very little chance of dispelling the prevailing ignorance and prudery of the masses.—I am, etc.,

Harrow. J. B. WRATHALL ROWE.

Colonial Medical Service

SIR,—In your issue of March 25 Dr. Morgan is reported (p. 440) as saying in the House of Commons on March 16 that "the Colonial Medical Service was one of the worst in the world." The exact implication of this generalization and the data upon which Dr. Morgan relied in arriving at it are not easy to assess. But so far as it concerns Tanganyika, Dr. Morgan's statement is strangely misleading. If he means that the medical department is much understaffed I am in full accord with him, but I cannot suppose that his remarks will be of assistance to the Colonial Office in their efforts to rectify the deficiency.

If, however, Dr. Morgan refers to the qualifications or performance of the medical staff he displays gross ignorance of facts which a cursory examination of the reports on the Territory would speedily dispel. The European staff of the Medical Department of Tanganyika, which has been but little augmented in the past twenty years, has not only met all demands imposed by the growth of other Departments, but has extended its activities in numerous directions. During the war it has made large contributions in personnel to the military Services, and has not only maintained its peacetime activities but has borne a greatly increased burden by the examination and care of large numbers of recruits. It has also provided medical attention for the numerous military units stationed in and passing through the country, and a large amount of work in connexion with Polish and other refugees, prisoners of war, etc., has fallen upon the Department. There has been no breakdown or suggestion of failure in the Department, despite all the additional work imposed upon a much reduced staff.

Statements such as Dr. Morgan's are such welcome material for the propaganda organizations of our enemies that I feel strongly the need for contradiction.—I am, etc.,

Boscombe. J. B. DAVEY,
Formerly, P.M.O., Tanganyika,
recently S.M.O., Tanganyika.

Tuberculin Patch Test

SIR,—Dr. Donald Paterson's tuberculin jelly patch test seems to have much to commend it, but in its place seems to be unnecessarily refined. All that is necessary to do a satisfactory patch test is ether or acetone for cleaning the skin, a solid glass rod—such as is used for the instillation of ointment into the eye—and a bottle of crude tuberculin. After cleaning

the skin a drop of tuberculin, the size of which can be controlled within fairly wide limits, is applied to the desired site (since reading Dr. Paterson's article I have been using the "V" sign), and covered with elastoplast. This idea was obtained from an article by Maurice Grozin in the *American Review of Tuberculosis*, Oct., 1943.—I am, etc.,

Penzance. G. A. M. HALL.

Tonsillectomy in Children

SIR,—I understand that Mr. Carew-Shaw fears that an evil-minded person who read my letter of March 11 without having seen his of Feb. 19 might think that I had imposed a slur upon his character and reputation. Certainly I had no such intention when I wrote, nor can I even now see that any such interpretation can be put upon my words; but I owe him the sincerest apology for any hurt that I may have done him.

I wrote that letter because of two causes that I have had at heart for many years. The one is opposition to the excessive removal of tonsils. I thought that in minds less acute than Mr. Carew-Shaw's and in hands less skilful his letter might result in an increase in the number of these operations just at the time when we have in view the hope that they may be reduced to reasonable proportions.

The other is the principle that has been accepted by the people that in future there shall no longer be one medicine for the rich and another for the poor. I feared that Mr. Carew-Shaw's contrast of the "private" with the "hospital" patient might result in the same suggestion of a varied service that has arisen under the N.H.I. between the "private" and the "panel" patient, and I felt that any such suggestion should be scotched at once. In trying to do this I used an expression that I had intended to be rhetorical and to suggest a *reductio ad absurdum*; but apparently it can be interpreted as being a slur upon Mr. Carew-Shaw, whereas, in fact, he has enrolled himself among those who have determined that the old conditions shall no longer remain.

I have long contended that the criticisms that have so freely been made against our profession of recent years are due not to any original sin inherent in the members of it but to the conditions under which we have to work; and that it must be the purpose of the medical statesman to provide conditions that will afford the opportunity to give equal service to all. At that and at that only was I aiming when I wrote my letter.—I am, etc.,

Guy's Hospital, S.E. T. B. LAYTON.

Obituary

J. ARGYLL CAMPBELL, M.D., D.Sc.

We regret to announce the death at Inverness on April 20 of Dr. J. Argyll Campbell, who had been a member of the research staff of the National Institute for Medical Research at Hampstead for 23 years.

James Argyll Campbell, son of James Colin Campbell, M.D., of Bute and Brisbane, was born in Australia on March 30, 1884, and was educated at Brisbane Grammar School and the University of Edinburgh, where he had a brilliant career, gaining nine university medals; he also won the Aitken Carlyle bursarship, the Carnegie and Crichton scholarships, and on two occasions the Vans Dunlop scholarship. He graduated M.B., B.Ch. (with honours) in 1909, received high commendation for his M.D. thesis in 1912, and was awarded the D.Sc. in physiology in 1914. He worked as research assistant to Sir E. Sharpey-Schafer in the physiological department at Edinburgh from 1909 to 1913, in which year he was appointed professor of physiology at the Government School of Medicine, Singapore, retaining that office until he came to London in 1921 to work under the Medical Research Council. During his time in Singapore Argyll Campbell served on a commission of inquiry in one of the Malay States, and was a member of the Medical Advisory Committee on Food Control in Singapore. He contributed to this and other journals a number of important papers on physiological subjects and on lung tumours in mice and in man, and collaborated in 1925 with Sir Leonard Hill in writing *Health and Environment*, and in 1934 with the late E. P. Poulton in writing *Oxygen and Carbon Dioxide Therapy*. The physiology of oxygen and its uses in medicine had attracted him for many years, and he became a recognized authority on that subject as well as on cancer of the lung.

In his youth Argyll Campbell had been a keen cricketer, playing for Edinburgh University and in inter-State cricket in Malaya. During recent years he was greatly handicapped by deafness. He gave ungrudging assistance to this *Journal* for some years as a leader-writer on those subjects in which he had special knowledge.

J. McK. CATTELL

James McKeen Cattell, the American psychologist, who died recently at the age of 83, has been described as the organizer of American science. He was, more strictly, its publisher, for he was the founder and editor of several scientific periodicals, both for the scientifically educated and for those who spoke only a lay language. Cattell made his reputation from the 'eighties onwards in the field of experimental psychology, and psychological research was one of his chief interests to the end of his life. At the turn of the century he was by far the most likely candidate for active leadership in American psychology, but as the years went on he found his greater work in the dissemination of scientific knowledge in general, and thus became a leader and servant of American science as a whole rather than of psychology only. He is said to have been the first American scientist to recognize the great power of print in the promotion of science; the attitude of some scientists, even among the greatest, has been that the publication of scientific work beyond the austere walls of a learned society vulgarized it in some way and perhaps hindered its fulfilment. Cattell took the opposite view. His chief organ was the weekly journal *Science*, published in Pennsylvania, and very much resembling *Nature* in this country. He edited *Science* from 1894 onwards, and it was his boast to have produced an impartial journal in which for half a century any reputable man of science could set forth his honest opinions, however controversial or however much at variance with accepted theory, about any matter of importance. A more popular presentation was afforded by another periodical, *The Scientific Monthly*, and he founded or helped to found a number of other journals dealing with psychology, philosophy, scientific methods, and education. Another useful labour of his was *American Men of Science*, of which the first edition was published in 1906 and the seventh is now in the press. This work called for laborious compilation and fine editing, the kind of task Cattell greatly enjoyed: it was a means of disseminating scientific knowledge in the form of biography.

Cattell was a leading figure in the American Association for the Advancement of Science. He induced it to establish a Section of Education, and himself worked to make it a success. In 1921 he organized the Psychological Corporation. This enabled psychologists, by undertaking practical service for business organizations and individuals, to earn funds to prosecute further psychological research. The venture was owned and operated by psychologists, not for private gain but for the advancement of their science. It now enjoys an income of £120,000 a year. Cattell was president of the American Psychological Society in 1895 and of the ninth International Congress of Psychology in 1929. At the age of 28 he was a professor in the University of Pennsylvania, and at the age of 31 became head of the department of psychology at Columbia. He was dismissed from this latter post in 1917 on a charge of "treason" because he had signed a petition urging Congress not to declare war, but his reputation suffered no lasting harm from that setback. He was a man of highly original character, fearless in urging what he believed.

The following well-known medical men have died abroad: Dr. BERNARD SACHS, an eminent New York neurologist, aged 80, author of *Mental and Nervous Disease in Children* (1926), *Nervous and Mental Disorders from Birth through Adolescence*, and *Keeping your Children Normal* (1936); Dr. LEO WALLACE DEAN, a prominent nose and throat specialist of St. Louis and editor since 1927 of *Annals of Otology, Rhinology and Laryngology*, aged 70.

Universities and Colleges

ROYAL COLLEGE OF PHYSICIANS OF LONDON

Election of Fellows

At a meeting of the College held on April 27, with Lord Moran, President, in the chair, the following were elected Fellows:

Norman Kletts, M.B. (Manchester); D. W. Winnicott, M.R.C.S. (London); S. E. Tanner, M.D. (Leicester); T. C. St. C. Morton, O.B.E., M.D. (R.A.F.); William Gunn, M.B. (London); A. Wilson Gill, M.D. (Newcastle, Staffs); C. N. Armstrong, M.D. (Newcastle-upon-Tyne); P. H. O'Donovan, M.D. (Nottingham); A. S. Wesson, M.D., F.R.C.S. (London); R. W. Brookfield, M.D. (Liverpool); H. A. Clegg, M.B. (London); W. E. Rees, M.D. (Swansea); P. E. T. Hancock, M.B. (London); A. B. Taylor, M.D. (Birmingham); T. F. Hewer, M.D. (Bristol); I. J. Wood, M.B.E., M.D., F.R.A.C.P. (Australia); G. B. Mitchell-Heggs, M.D. (London); R. E. Tunbridge, M.D. (Leeds); W. I. Card, M.D. (London); C. H. Stuart-Harris, M.D. (London); F. Graham Lescher, *M.C.*, M.D. (Derby); C. T. Potter, M.D. (London); Sir Rupert Briercliffe, C.M.G., O.B.E., M.D. (Barbados); C. G. Barnes, M.D. (London); J. R. Rees, M.D. (London); A. R. Gilchrist, M.D. (Edinburgh); G. L. Taylor, M.D. (Cambridge); Alexander Fleming, F.R.S., F.R.C.S. (London); D. K. Henderson, M.D., F.R.C.P.Ed. (Edinburgh); Lieut.-Gen. Sir Alexander Hood, K.C.B., C.B.E., M.D.; Col. W. S. Middleton, M.D., F.A.C.P. (America).

Dr. G. E. S. Ward was appointed external examiner in medicine for the Fellowship Examination of the Faculty of Radiologists. L. A. Clark, Dr. H. A. Dunlop, Dr. R. V. Christie, and Sir Robert Stanton-Woods were appointed examiners for the Diploma in Physical Medicine. Dr. Leonard Parsons and Dr. Donald Paterson were appointed representatives to attend the conference of the National Association of Maternity and Child Welfare Centres.

The following candidates, having satisfied the Censors' Board, were admitted members:

I. Ansell, M.B., Sheila T. E. Callender, M.D., Joyce A. Keeping, M.D., K. H. Lim, M.B., Fl. Lieut. D. S. Munroe, R.C.A.F., Y. H. Ng., M.B., Capt. C. G. Phillips, R.A.M.C., Flying Officer O. L. S. Scott, R.A.F., Capt. P. J. Sweeney, R.A.M.C., G. T. G. Thomas, M.B., Col. J. R. D. Webb, O.B.E., I.M.S.

Licences to practise were conferred upon the following 146 candidates (including 21 women) who had passed the Final Examination in Medicine, Surgery, and Midwifery of the Conjoint Board, and have complied with the necessary by-laws:

C. C. A. Adeniyi-Jones, T. B. Anderson, W. A. Ashford Hodges, C. G. Attenborough, D. B. Austin, J. P. Barham, J. A. Barlas, D. V. Bates, R. L. Batten, M. A. Bazett, M. Bendit, Jean G. Brabner, D. L. Broadhead, Jean A. Broughton-Alcock, A. Brown, G. L. Bunton, E. Burman, R. Cannon, I. McC. Carmichael, Frances N. Carr, A. P. Chaudhuri, Peggy J. Clark, D. M. Clement, S. Coffey, W. R. Cole, M. D. M. Collins, A. Comfort, H. A. Condon, G. N. Cooke, W. E. Craddock, J. A. Daff, J. E. Davies, C. C. Dawson, C. E. Dent, A. B. Dickie, Mary P. Douglas, J. A. Dudgeon, N. A. Duncan, W. J. D. Eberlie, D. A. W. Edwards, G. K. Emsley, H. L. English, A. M. Evans, E. A. Fairburn, Mary Farquharson, T. R. Farrimond, R. L. M. Ferrari, C. G. Fox, S. Freedman, J. Fry, J. H. Gibson, H. McC. Giles, M. T. Gillies, M. L. Græme, B. Green, B. V. I. Greenish, Cecilie Greig, S. C. Harper, H. L. Harris, W. R. Harrison, C. J. V. Helliwell, J. M. Hill, C. B. Holmes, H. Howell-Jones, Rachael C. A. Hunter, L. G. Jackson, D. M. M. Jones, J. G. P. Jones, V. H. Jones, H. Kaufman, M. D. Keates, J. V. Kent, A. C. de C. Kerr, Eileen Keventer, June M. Kingan, Elizabeth M. Kingsley Pillers, Joyce E. Landau, F. W. Lapage, L. G. H. Le Clercq, J. C. S. Leverton, L. N. Lightstone, D. W. R. Lyle, J. D. M. Lytle, P. F. M. MacDonagh, P. N. MacGinnis, I. L. McKelvie, J. L. F. Maine, Sheila M. Martin, M. B. Matthews, E. V. M. Medill, J. L. Middlemiss, R. Milton, Stella M. Murray, Constance B. S. Napier, R. W. Nash, H. M. Nooroova, K. W. Oldham, K. Owen, C. R. Oyler, D. B. L. Pailthorpe, K. E. Pembrey, P. B. Philip-Smith, T. L. C. Pratt, Kathleen L. Prendergast, J. R. Prentice, C. F. G. Prideaux, D. H. Rees, R. E. Rees, T. H. Richards, G. F. Roberts, J. Roche, R. C. Roxburgh, D. Ryan, J. R. T. Selby, W. S. Sellars, E. S. Shalom, Patricia E. Sichel, O. A. Sills, P. H. Smith, W. H. R. Smith, H. P. Speed, S. J. Steel, T. R. Steen, J. W. Stewart, Catherine Storr, L. W. Suleiman, J. L. Taylor, G. H. Tee, Barbara K. Thompson, D. A. Tilsley, I. P. Todd, W. G. Toole, F. I. Tovey, P. M. Tow, D. R. D. Vanstone, M. H. D. Veale, J. L. Wakelin, Jean M. Watson, B. L. Whitehead, J. D. A. Whitelaw, Marjorie J. Williams, J. L. Winkler, M. P. Winstanley, A. B. Wood, G. J. E. Wood, G. S. Yeoh.

Diplomas in Ophthalmic Medicine and Surgery (17), and Medical Radiology (5) were granted, jointly with the Royal College of Surgeons of England to the persons whose names were published in a report of the Royal College of Surgeons of England in the *Journal* of March 18 (p. 409). Diplomas in Child Health were granted to the 16 persons whose names were published in the report of the meeting of the Royal College of Surgeons of England in the *Journal* of April 29 (p. 605).

UNIVERSITY OF OXFORD

In Congregation on April 3 the following medical degrees were conferred:

B.M., B.Ch.—J. B. Jeffries, W. S. Hamilton, W. E. Ormerod, G. R. Venning, R. G. Harrison, T. Bell, P. P. H. Schmidt, Margaret M. Shattock, Joan M. Levitt; and V. W. Zetlin and J. M. K. Marsh (in absence).

UNIVERSITY OF CAMBRIDGE

The Linacre Lecture will be delivered by Col. Elliott C. Cutler, M.D., Chief Consultant in Surgery, U.S. Army, European Theatre of Operations, Moseley Professor of Surgery in Harvard University, to-day (Saturday, May 6) at 5 p.m., in the Lecture Room of the Anatomy School. The title of the lecture is "A Surgeon Looks at Two Wars."

The following have been approved for the degree of M.D. in absence: T. B. L. Bryan, A. J. Daly, S. T. Anning.

Medical Notes in Parliament

Penicillin Clinical Trials Committee

Answering Major Lyons on April 19 Mr. ATTLEE said the only change in membership of the Penicillin Clinical Trials Committee (set up by the Medical Research Council) since a previous answer on June 10, 1943, had been the appointment of six additional members. A report on the use of penicillin in treating war wounds was published on March 24 as Medical Research Council War Memorandum No. 12. A full account of work done at one of the main centres where trials were being made was published in the *British Medical Journal* on April 15. Further reports were being prepared. There was close contact between the Council and the firms manufacturing penicillin, who were represented on it.

Mr. LEVY: Is my right hon. friend aware that the *British Medical Journal* is a very illuminating journal, which ought to be circulated much more widely than it has been in the past?

Mr. ATTLEE later named the present members of the Committee, as follows: Prof. H. R. Dean (chairman), Prof. J. H. Burn, Dr. A. N. Drury, Surg. Vice-Admiral Sir Sheldon Dudley, Prof. A. Fleming, Prof. H. W. Florey, Dr. A. M. H. Gray, Dr. P. Hartley, Mr. R. Vaughan-Hudson, Air Vice-Marshal G. L. Keynes, Prof. J. R. Learmonth, Major-Gen. L. T. Poole, Dr. C. M. Scott, Dr. J. W. Trevan, Prof. R. V. Christie (secretary), and Prof. L. P. Garrod (assistant secretary).

Gold Treatment of Arthritis

On April 20 Major LYONS inquired what was being done by the Ministry of Health in the development of the gold treatment for arthritis. Mr. WILLINK said clinical research into the value and correct dosage of gold salts in this form of rheumatic disease had been continued by the Empire Rheumatism Council, whose latest report said that no definite conclusions could yet be announced. The results reported as having been obtained by this form of treatment up to the present by no means justified any claim that it was uniformly successful.

Increase in Short-term Sickness

Mr. WILLINK, answering Sir Henry Morris-Jones on April 20, said sickness benefit claims of approved societies showed a material increase in 1942 and a further rise in 1943, as compared with the pre-war average, in short-term sickness among insured persons, both men and women. It was not possible to state the precise extent of the increase. There was no statistical information available on sickness among domestic housewives. Detailed information on mortality rates was not yet available, but a provisional count indicated that the death rate in 1943 was slightly higher, at 11.1 per 1,000 population, than the figure of 10.5 recorded for 1942.

Mental Health Services

In reply on April 27 to Mr. Ritson Mr. WILLINK said it would not be feasible to undertake a full restatement of the law of lunacy before the introduction of the National Health Service. At this stage, therefore, it was proposed only to make such amendments as were needed to enable the administration of the mental health services to be included in the one comprehensive service. These would be discussed with the local authorities and others concerned. No general survey of the mental health services was contemplated, but a special survey of certain important aspects, with particular regard to the provision for neurosis, was in progress.

Tuberculous Ex-Service Men.—Mr. MCNEIL on April 4 asked the Secretary of State for Scotland whether there was any priority of medical treatment for ex-Service men afflicted with tuberculosis in any of its forms, or whether medical officers of health, in granting priorities of treatment, had regard solely to the medical needs of the patient. Mr. JOHNSTON replied that local authorities gave the necessary treatment as quickly as possible to ex-Service men suffering from any form of tuberculosis. Where sanatorium treatment was not required this usually presented no difficulty. Most local authorities, however, had a waiting list of tuberculous patients who required

sanatorium treatment, and the chief determining factor in deciding priority of admission to sanatoria must be the medical needs of the patient.

Prison Dietary.—Mr. PEAKE stated in reply to Mr. Astor on April 5 that pre-war prison diet was based on the advice of an expert committee. The present diets are based on the full civilian ration, and such tests as the reports of medical officers, the absence of waste, and the rarity of complaints suggested that they were satisfactory. The Prison Commissioners had not had occasion to consult the Ministry of Food about prison diets, but they had recently approached the Medical Research Council, who had undertaken to place at their disposal the advice of a dietetic expert. Dr. MORGAN asked how many cases of pellagra had been diagnosed in prisons owing to this diet. Mr. PEAKE said that did not arise on the question put to him.

Supply of Doctors in India.—Miss WARD inquired on April 20 what steps were being taken in India to increase the number of doctors and to raise the standard of medical education. Mr. AMERY replied that future developments were being considered by a committee presided over by Sir Joseph Bhore. Among the many subjects engaging its attention were the standards of medical education and the increase of facilities for medical relief in rural areas. To meet the shortage of medical personnel in India, fuller use was being made of licentiate doctors, and an improvement was being made in their standard of training.

Notes in Brief

Arrangements are being made by Col. Llewellin which, it is hoped, will result in enough bananas being imported in dried form to provide all approved cases of coeliac disease with the supplies needed.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* the returns for whooping-cough, measles, and diphtheria were 307, 235, and 62 respectively higher than those for the previous week. The notifications of scarlet fever fell by 219, those for dysentery by 71, and those for acute pneumonia by 20.

The lower incidence of scarlet fever was general, but was especially marked in Lancashire and Middlesex, where 55 and 33 fewer cases were recorded than last week. The rise in diphtheria was confined to the north; Yorks West Riding recorded 33 more cases than last week, Lancashire 17, and Durham 12. The increase in whooping-cough was mostly in the south; Sussex recorded 48 more cases than last week, and Kent 46. In London, however, the returns fell by 28. The increased incidence of measles was general; the principal exception was London, where a drop of 51 cases was recorded. The largest rise in measles was in Kent, with 82 more cases than last week.

For the first time for ten weeks fewer than 200 cases of dysentery were notified. The highest returns of this disease were Lancashire 34, Surrey 30, London 21.

In *Scotland* notifications of diphtheria were 50 higher than last week, those of acute primary pneumonia were 46 higher, those of scarlet fever 41 higher, and those of cerebrospinal fever 18 higher, while those of whooping-cough and measles recorded 33 and 30 fewer cases respectively. The chief centres of infection of dysentery were the cities of Edinburgh 29, Glasgow 13, and the counties of Lanark 23, Argyll 10, Stirling 11.

In *Eire* the chief feature of the returns was the increase of 76 over the previous week in the notifications of measles. In Dublin C.B. there was a drop of 31. The largest returns were Dublin C.B. 85; Cork C.B. 52; Waterford C.B. 44; Limerick C.B. 39; Dublin, Rathdown No. 1 R.D., 36; Dublin, Dun Laoghaire U.D. 22; Cork, Cork R.D. 20.

Reproduction Rate in England and Wales

The provisional reproduction rate for 1943, given in the quarterly return for 1943, was 0.903. This is the highest value for nearly twenty years. This rate is 9.7% less than that necessary for maintaining a stable population if the improvement in mortality trends are maintained, and if young women of the future—babies now—produce births at the same rate as was operating in the year of their birth. In recent years the number of births has been only a little more than three-quarters of those necessary to prevent a decline in the population; during 1933–4 the reproduction rate varied between 0.747 and 0.810, and there was an improvement in 1942, with a rate of 0.853.

Week Ending April 22

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,607, whooping-cough 2,321, diphtheria 622, measles 2,784, acute pneumonia 829, cerebrospinal fever 75, dysentery 204, paratyphoid 2, typhoid 1. No cases of smallpox were notified for the first time for eight weeks; a total of 17 were reported in the preceding seven weeks.

No. 15

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended April 15.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1944 (a)	(b)	(c)	(d)	(e)	1943 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	96	5	35	1	2	103	9	29	2	7
Deaths		1	2				1	4		
Diphtheria	616	27	201	100	26	723	34	187	100	24
Deaths	9	1	2	4	—	16	2	4	2	—
Dysentery	179	21	114	—	6	107	13	45	—	1
Deaths				—	—				—	—
Encephalitis lethargica, acute	2	—	3	—	—	2	1	1	—	—
Deaths		—					—			
Erysipelas			49	12	6			58	12	1
Deaths		—					—			
Infective enteritis or diarrhoea under 2 years				8					36	
Deaths	63	12	21	13	2	49	5	6	9	4
Measles	2,578	273	239	382	3	16,732	1,041	687	7	90
Deaths	3	—	—	4	1	12	1	1	—	2
Ophthalmia neonatorum	67	3	25	—	—	91	4	20	—	—
Deaths										
Paratyphoid fever	2	—	1 (B)	—	—	3	—	2	—	—
Deaths	—	—	—	—	—	1	—	—	—	—
Pneumonia, influenzal*	983	62	10	2	4	1,139	70	7	13	11
Deaths (from influenza)	27	4	1	2	—	43	1	4	1	2
Pneumonia, primary			273	36				250	39	
Deaths		68		6	15		49		11	14
Polio-encephalitis, acute	1	—				1	—			
Deaths		—					—			
Poliomyelitis, acute	4	—	—	—	—	5	—	—	1	—
Deaths		—					—			
Puerperal fever		3	15		—		5	12		—
Deaths										
Puerperal pyrexia†	163	5	17	3	1	159	7	17	3	1
Deaths		1					—			
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,870	89	236	24	75	2,058	173	260	39	53
Deaths	—	—	—	—	—	2	1	—	—	—
Smallpox	1	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Typhoid fever	5	1	1	13	1	11	2	2	8	1
Deaths	—	—	—	—	—	1	—	1	—	—
Typhus fever	—	—	—	—	—	←	—	—	—	—
Deaths				—	—				—	—
Whooping-cough	1,865	176	56	73	16	1,944	137	277	40	35
Deaths	13	3	—	3	2	13	2	5	3	1
Deaths (0–1 year)	392	53	87	33	25	388	54	65	51	31
Infant mortality rate (per 1,000 live births)										
Deaths (excluding stillbirths)	4,699	728	665	248	139	4,707	682	657	233	156
Annual death rate (per 1,000 persons living)			15·3	16·2	‡			14·8	15·3	‡
Live births	7,353	861	975	470	287	6,550	764	1019	401	309
Annual rate per 1,000 persons living			19·8	30·7	‡			20·8	26·4	‡
Stillbirths	256	19	37			236	27	39		
Rate per 1,000 total births (including stillborn)			37					37		

* Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

† Includes puerperal fever for England and Wales and Eire.

‡ Owing to evacuation schemes and other movements of population, birth and death rates for Northern Ireland are no longer available.

The Services

Air Vice-Marshal A. F. Rook, O.B.E., has been appointed an Honorary Physician to the King in succession to Group Capt. G. S. Marshall, O.B.E., who has vacated the appointment on retirement from the R.A.F.

Capt. G. H. A. Simmons, R.A.M.C., has been mentioned in dispatches in recognition of gallant and distinguished services in the field and Brig. (Temp.) H. G. Furnell, C.B.E., D.S.O., has been mentioned in recognition of gallant and distinguished services in the South-West Pacific.

Medical News

The *Practitioner* announces with regret that, owing to age, Sir Humphry Rolleston has had to resign from the position of editor, which he has so successfully held since 1928. Until further notice Dr. Alan Moncrieff, associate editor since 1934, will act as editor.

At the annual general meeting of the Section of Psychiatry of the Royal Society of Medicine to be held at 1, Wimpole Street, W., on Tuesday, May 9, at 5 p.m. a discussion on morale will be opened by Surg. Lieut. G. Garmany, Lieut.-Col. G. R. Hargreaves, Wing Cmdr. J. H. Hunt, and Dr. A. B. Stokes.

A meeting of the Tuberculosis Association will be held at Manson House, 26, Portland Place, W., on Friday, May 19, when Surg. Capt. W. D. W. Brooks and Dr. A. K. Miller will open a discussion on treatment of the minimal lesion as found by mass radiography. Dr. Joseph Smart will give a short paper on two unusual cases of asthma.

The summer meeting of the Association of Industrial Medical Officers will be held in Birmingham on Friday, May 19, and Saturday, May 20, under the chairmanship of Dr. J. C. Bridge. On Friday there will be a business meeting at the Queen's Hotel, New Street Station, at 4.30 (tea at 4 p.m.), followed by dinner at 6.30 for 7 p.m. at the White Horse Hotel, Congreve Street. On Saturday, at the Tatler News Theatre, Station Street, Mr. E. A. Nicoll will show the new British Council film "Accident Service," at 9.45 a.m. At the Birmingham Accident Hospital, Bath Row, at 11 a.m., a discussion on "Rehabilitation and Industry" will be opened by Prof. Seymour Barling, Mr. William Gissane, Dr. N. T. Glynn, and Mr. G. M. Farrer. Luncheon will be provided at the hospital at 1 o'clock. In the afternoon a tour of the new departments of the hospital has been arranged, followed at 3.15 p.m. by demonstrations and clinical cases. Arrangements for this meeting are in the hands of the local secretary—Dr. W. Jeaffreson Lloyd, Guest, Keen and Nettlefolds Ltd., Heath Street, Birmingham, 18.

A whole-day conference of the Nutrition Society will be held on Saturday, May 20, beginning at 10.50 a.m., at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, with the following programme: "Budgetary and Dietary Surveys of Families and Individuals, Part II," papers by Miss E. M. Widdowson and Dr. R. A. McCance ("Dietary Surveys by the Individual Method"); Dr. Gertrude Wagner ("Surveys of Methods used in Preparing and Cooking Food"); Dr. G. N. Jenkins, Dr. L. W. Mapson, and Miss M. Olliver ("Laboratory Assessment of Nutritive Value of Meals as Eaten"). Papers on Food Consumption: Data Obtained from Analyses of Institutional Diets will be read by (*a*) Miss E. M. Langley ("School Diets"); (*b*) Dr. M. Pyke ("Industrial Canteens"); (*c*) Dr. A. Lyall ("Hospital Diets"). The openers of the discussion will be Prof. V. H. Mottram, Mrs. Barbara Callow, Dr. C. P. Stewart, and Miss M. C. Broatch. Further details of the Nutrition Society can be obtained from the hon. secretary, Dr. Leslie J. Harris, Nutritional Laboratory, University Field Laboratories, Milton Road, Cambridge.

On May 2 representatives of the Royal College of Nursing discussed with the Minister of Health modern trends in the development of the nursing profession, especially in relation to a comprehensive health service. Lord Horder, who, as chairman of the College's Nursing Reconstruction Committee, accompanied the deputation, said that his committee had been greatly heartened at the speed with which the main recommendations on the committee's first report—that on the assistant nurse—had reached the Statute Book. He briefly outlined the committee's recommendations for a wider and more elastic basic training for the nurses of the future, to include an insight into preventive and social medicine, and experience in certain special branches of nursing not hitherto covered. In this way the young nurse would view the whole nursing field in better perspective, and her interest would be aroused to the scope and opportunity for service in branches at present sadly understaffed. Recognition of real student status for the nurse in training would have a far greater influence on recruitment than any other single measure.

Letters, Notes, and Answers

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 2111. TELEGRAMS: *Aitiology Westcent, London.* ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.

ANY QUESTIONS?

Frequency of Defaecation

Q.—*I have come across two patients who state that they are in better health when they defaecate only on alternate days than when they try to do so daily. In one patient a type of vagus nerve hyperactivity appeared to occur when daily defaecation was attempted. Can this be explained, and how should it be treated?*

A.—No satisfactory definition of constipation has ever been made and it would be difficult to construct a distribution curve of the normal frequency of evacuation of the bowel in this country, owing to excessive bowel consciousness and the advertisement of purgatives on the one hand, and the inhibitions produced by gearing humanity to modern industrial and transport conditions on the other. There is little reason to doubt, however, that there is a range of variation in the frequency of normal evacuation of the bowels, as in other rhythmic functions such as the pulse rate or menstruation. Some people defaecate twice daily, others are upset if they worry their intestines into a daily action and are much better if their bowels are opened only twice a week. The chief physical ill effects of constipation are hardening of the faeces, which may then cause fissures on expulsion, and distension of the bowel, which may bring about reflex disturbances or actual obstruction. None of these is likely to happen when defaecation occurs on alternate days. The psychological effects of constipation are much more subtle, inasmuch as training in bowel habit forms so large a part of the early education of the child. The normal bowel habit of an individual may be the resultant of several physiological and psychological forces, and the attempt to disturb it may well arouse unconscious anxiety. The patient should be assured that an action of the bowels on alternate days is perfectly normal, and that attempts at interference are undesirable.

Marital Difficulties and Service Life

Q.—*I am concerned about a delicate problem, which has grown from one or two isolated cases to a number which is assuming proportions I feel need consideration. The patients are married men and all have the same complaint—namely, the inability to obtain an erection when desiring intercourse. In each case the facts are materially as follows: (1) They are healthy, vigorous, active types, performing their Service duties efficiently and without undue fatigue. (2) There is no evidence of constitutional or other organic disability. (3) All claim to be fond of their wives and affirm that it is no lack of love or desire on their part (a frequent cause of this disability in other cases). (4) All look forward with keen anticipation to intercourse on their periods of leave or time off. (5) In each case the lack of ability to obtain an erection has caused considerable mental upset to the man, frustration for the woman, and bids fair to upset marital happiness, which in any case, in wartime, is in none too stable a state. In some cases charges of unfaithfulness and lack of love have been made by the wives, which are quite understandable. Men return home or go on leave, possibly pre-occupied with Service problems, or concerned with matters other than domestic. I feel that the basis is a mental one rather than physical, and should be glad of any help.*

A.—The problem of partial or complete impotence in men long separated from their wives, especially on military service, can best be understood in terms of the psycho-analytic libido theory. It is commonly observed that the good soldier "invests" much of his available emotional energy in an all-male group—i.e., in the questioner's words, he is preoccupied with Service matters. This often means a reanimation of an adolescent pattern of interests and loyalties: without such bonds morale and *esprit de corps* could not exist. To the extent of this change in "libido economy," the wife and home become more remote, the man's attitude divided. Like the adolescent, he nourishes a great fantasy of sexual potency, when in reality there is every gradation between this condition and com-

plete erotic estrangement. It is unfortunately true that the military uni-sexual *milieu*, devoted to destruction, is antagonistic to Eros, and that the very promiscuity of soldiers is mostly an attempt to allay the fear of impotence arising from this enforced mass regression to the "boys together" level. To the above predisposing situation must be added possible anxiety and rush to catch the earliest train, arrival in a fatigued condition, and the challenge of "proving" one's love and power as soon as possible. As put by a colleague: "He feels he ought to be lusting for his wife instead of settling down for a day or two. . . . He makes it a point of duty to try to do a star performance—and both take the first-night failure as something final." Anxiety and conscious preparation, inferiority, guilt, and suspicion complete the aetiology. In fact both partners have become desensitized and need a period of days to re-establish erotic intimacy. In sexual relations, as in digestion, psychology largely governs physiology.

As prophylaxis a general talk to married men proceeding on leave may dwell on these notions: the possible sense of strangeness, the happiness of a new courtship, the need for being rested and reattuned, and the error of being in too great a hurry. The tone must be friendly, reassuring, and not suggest failure, but rather assume the naturalness of such a state of affairs in most couples separated for a time. In treatment after such an occurrence the wife's doctor may need to co-operate on similar lines, while the man's M.O. prepares him as above for the next occasion—aided in some cases by a suggestive "tonic." Unit M.O.'s should enlist the help—not necessarily by referring the men—of Service psychiatrists, whose duty it is to watch over the mental health of the Forces.

Vaccines for Arthritis?

Q.—*Would you advise treatment by vaccines in a case of arthritis of the spine where there is no obvious locus of infection?*

A.—The late Dr. Okell, formerly professor of bacteriology at University College Hospital, who suffered from spondylitis, expressed the following opinion: "Is it reasonable to treat a supposed infective disease with a vaccine made from a micro-organism when there is no acceptable evidence that disease is caused by the micro-organism in question? The answer must be, No. . . . There seems no convincing evidence that a human disease has ever been cured or significantly benefited by vaccine treatment" (*Reports on Chronic Rheumatic Diseases*, R.C.P., 1937, **3**, 3). No doubt enthusiasts may be found to disagree with this conclusion, but the whole article is worthy of careful study. I am definitely of opinion that in such a case as the question refers to vaccines would be useless, and I have seen many cases in which treatment by vaccines has made the victim of arthritis worse, apparently from sensitization. Rest and general measures to build up resistance furnish in most cases the safest and best line of treatment, though good results have been obtained by deep *x* rays in expert hands.

B. Coli in Urine

Q.—*I would like advice about a small girl aged 6 with B. coli infection of the urinary tract. She was treated for about three months with alkali without benefit; to this was added a course of sulphapyridine, the alkali being continued—again no result. What further treatment should be tried?*

A.—Treatment with any of the sulphonamides should have cleared up an uncomplicated urinary tract infection with *B. coli*. It should first be determined by bacteriological examination of the urine whether the same infection still exists. Persistence might be due to the co-existence or substitution of another infection by an organism not susceptible to sulphonamides, such as *Str. faecalis*. This infection responds only to mandelic acid treatment, which is also worth trying in the presence of atypical and sulphonamide-resistant coliform bacilli. If antiseptic treatment still fails, there is likely to be some abnormality of the urinary tract, such as a hydronephrosis, predisposing to infection and its continuance.

It is assumed in this answer that an infection is known certainly to exist, but it should perhaps be pointed out that female specimens of urine always contain cells and bacteria, including sometimes *B. coli*, which have merely been washed off the vulva. These bacteria may multiply rapidly in the specimen if its examination is delayed, and produce the picture of at least a bacilluria. There are objections to catheterizing a child, but if the diagnosis is in doubt, and prolonged treatment or elaborate further investigation depend on it, an uncontaminated specimen must be obtained.

Paralysis Agitans

Q.—*Can you suggest further treatment for a case of paralysis agitans in a retired medical officer who has spent some years in tropical Africa? Sedative drugs, gland extracts, and vitamin B have been tried without benefit.*

A.—It is unlikely that residence in the Tropics will have influenced the onset of paralysis agitans. In this case the first point to be decided is whether it is a post-encephalitic syndrome or whether it is secondary to vascular changes, or simply the paralysis agitans of old age. Because of the chronicity of the condition, very many different kinds of treatment have been tried; most of them have not shown any advantage over more usually accepted drugs such as the alkaloids atropine, hyoscine, and scopolamine. An excellent review of the effects of various kinds of treatment will be found in the clinical study by J. B. Neal entitled *Encephalitis*, published in New York in 1942. It is shown quite clearly that vitamin therapy and gland extracts have no place in symptomatic treatment, whilst sedative drugs have a very slight effect.

In using the alkaloids it is most important to push the dosage to a high level, if necessary, to produce relief of symptoms, and it is also advisable to try different combinations, since there is a great individual variation in response. To do this the patient should, of course, be under observation. Treatment should be begun with small doses and pushed to the limit of the patient's tolerance, care being taken that he has not any evidence of glaucoma. The beneficial effect of persistent exercise and physiotherapy must be remembered.

Implantation Cancer

Q.—*We are all familiar with cancerous growth developing in a scar after operation for cancer (autogenous implantation), but has there ever been implantation of cancer in other wounds—e.g., a surgeon's hand? Has any case ever been recorded of cancer of the penis following sexual intercourse with a woman suffering from carcinoma of the cervix?*

A.—There are no authentic reports of accidental homologous implantation of cancer in human beings. Deliberate experiments have been made to transplant cancer from one person to another. Thus Alibert allowed himself to be injected with ichorous material from a cancer of the breast (1808). In recent times Senn (1901) transplanted into himself a fragment of lymph node in which carcinomatous invasion had been demonstrated by the microscope. A nodule the size of a pea appeared at the implantation site and remained stationary for two weeks and then regressed.

We now know from experiments on animals that transplantation of cancer from one human being to another would not be likely to be successful in more than a small percentage of inoculations and then only under propitious circumstances—e.g., sterile grafts composed of many thousands of healthy cancer cells, and a near genetic relationship between host and graft. Accidental injury at an operation could not provide the necessary conditions. In a famous case in Paris about 15 years ago a house-surgeon accidentally pricked his hand with a needle which had been used to draw off fluid from a cystic mammary cancer; a sarcoma, which eventually caused death, developed at the site of the injury. This was not an "implantation cancer," since the tumour of the hand differed in structure from breast tumour.

Cerebral Thrombosis

Q.—*What is the treatment for cerebral thrombosis?*

A.—In the acute stage of cerebral arterial thrombosis, to which the question presumably refers, treatment is directed towards preventing extension of the thrombus by increasing cardiac efficiency, diminishing the clotting power of the blood, and reducing progression of arterial degeneration, which is the prime cause of the thrombus. (Any cause for the degeneration, such as renal disease, diabetes, or syphilis, should be sought.) Rest, fluids, and glucose are needed; purgation should be avoided, and, if fibrillation or cardiac embarrassment are present, digitalis should be given. Injections of strychnine may also help. The clotting time can be increased by injections of heparin, and sodium iodide by mouth is said to diminish the spread of atheroma, though this is very doubtful. Once the acute stage is passed the patient should be got up, and exercises, massage, and movements of the affected limbs should be undertaken. It is most important to keep the muscles working and the patient active.

Scissors Gait in Disseminated Sclerosis

Q.—*Some time ago I became afflicted with disseminated sclerosis. My condition has recently improved, and I now need some rehabilitation exercises which will help me to counter the occasional blocking of left (affected) foot by right foot in walking. I attribute this to the fact that the right foot encroaches on the middle line, thus seeking centre of gravity, but impeding the already embarrassed left foot. This blocking is occasional only and does not seem to be due to definite paralysis or paresis. What remedial exercises are advisable to inculcate a correct sense of centre of gravity? My difficulty is present in walking only. I can stand up from my chair under my own power, and, unsupported, can use my companion hair brushes. I should also like to know where to obtain the latest references to this disease.*

A.—The symptom which is complained of is surely a slight scissors gait, a more severe example of which is seen in Little's disease. It is due to spasticity which affects the adductor muscles. These occasionally go into spasm with consequent dragging of the leg over the midline. Sparing of the arms might be expected if the

weight of the disease were upon the dorsal spinal cord. I do not think there are any special exercises to relax the spasm, since it is due to over- and not under-action of the muscle. The most recent literature on disseminated sclerosis deals with the theory that it is caused by venous thrombosis in the central nervous system, and many of the references may be found in the *Archives of Neurology and Psychiatry* of the last two or three years.

Ridged Finger Nails

Q.—*What are the causes and treatment of ridged finger nails? The patient has an asthmatic history and is subject to bronchitis.*

A.—Ridged finger nails with transverse furrows are usually the consequence of some local or general disturbance of nutrition, and may thus be related to attacks of asthma or bronchitis. Median striation describes the ridge extending down the centre of the nail which can be remedied in many cases by small doses of *x* rays given by an expert.

Toxicity of Waterglass

Q.—*Is waterglass a poison? I have heard of a man who drank about a tumblerful thinking it was lemonade, and died in about two days. In another instance waterglass was given in mistake for glucose. I cannot find any reference to waterglass as a poison in any of my books.*

A.—Waterglass is a solution of sodium silicate of varying but high alkalinity, and the poisonous effects are most probably due to corrosive poisoning by free NaOH. It would have been interesting to have an estimation of the *p*H of the actual solution in cases mentioned. It is not unlikely that commercial samples of waterglass may be caustic from excess of alkali. Recent analyses in Germany have shown frequent adulteration with sulphur compounds and with sodium sulphate. When administered to dogs by mouth, waterglass caused inflammation and ecchymoses of the gastro-intestinal mucosa and congestion of the kidneys with infarction of the tubules. By intramuscular injection it was fatal. A dose of 15 gr. (1 g.) to rabbits induced alteration in the blood and fatty degeneration of the liver (*Legal Medicine and Toxicology*, Peterson, Hamis, and Webster, 2nd edition, vol. 2, W. B. Saunders Company, 1923). A case was reported by Eichhorst, 1920 (*Schweiz. med. Wschr.*, Nov. 25, **50**, 1081), of a man who recovered after drinking by mistake 200 c.c. (6.75 fluid ounces). Prompt vomiting removed some of the substance, but enough remained to irritate the alimentary mucosa, causing vomiting, diarrhoea, severe abdominal pain, and occult bleeding. Excretion by the kidneys caused albuminuria, tube casts, sugar, acetone, and blood in the urine for a few days. The temperature and blood pressure were raised, and the blood picture showed lymphocytosis.

LETTERS, NOTES, ETC.

Cecil Rowntree Memorial

Dr. A. C. SOMMERVILLE (hon. secretary, Medical Committee, Queen Victoria Hospital, East Grinstead, Sussex) writes: I should be very grateful if you would allow me to call the attention of any of your readers who might be interested in the proposal to establish a Cecil Rowntree Medical and Surgical Reference Library at the Queen Victoria Hospital, East Grinstead, to perpetuate the memory of the late Mr. Cecil Rowntree, F.R.C.S. Apart from his many other activities Mr. Rowntree was honorary surgeon to this hospital for upwards of twenty-five years. His colleagues and his many friends and patients in the neighbourhood will always remember his name with respect for his skill and with gratitude for his many kindnesses. It has therefore been decided to erect some permanent memorial to his name, and it is felt that there could be no better plan than the above. Gifts of books or the means of purchasing them will be gratefully received and acknowledged by the secretary-superintendent of the hospital.

Asthma in Children

Dr. ALEXANDER FRANCIS (London, W.1) writes: The article "Chronic Pulmonary Catarrh in Children," by Dr. Brian Taylor (April 1, p. 453), shows a lack of appreciation of the real significance of asthma and other bronchial symptoms. Dr. Brian Taylor evidently considers asthma a substantive disease. He says that in his asthma clinic in 1942, among 63 children under the age of 14, in only 12 cases "did it seem that the condition was a true allergic asthma." There is no such thing as "true allergic asthma." Asthma is only a symptom, comparable with pulmonary catarrh and sneezing. Various allergens are certainly capable of producing attacks of asthma, but they are no more the basic cause of the asthmatic condition than a chill producing an ague is the cause of malaria. I know of cases in which when the vasomotor system has been made stable allergens which once were highly irritating lose their power of producing an attack of asthma. This fetish of allergy seems to have warped our common sense. Undoubtedly climate and certain subsoils have a marked effect upon the circulation; and if children suffering from pulmonary catarrh and asthma can be sent to Switzerland, as Dr. Brian Taylor suggests, they will lose their trouble, and provided they can live there long enough to establish a proper circulation they can return to this country and remain free, but this is impracticable and in the majority of cases unnecessary. Properly controlled courses of breathing exercises, muscular exercises, and cutaneous massage are essential, and immense good can be done by an almost imperceptible touch on the mucosa of the nasal septum with a fine cautery point. This, by reflex action through the nasal nerves on the sympathetic system, does much to regulate and stabilize the whole vasomotor system.

New Zealand Hospital on Fifth Army Front

We have received from the New Zealand Government Offices in London the following note: Within the sound of big guns booming out their hymn of hate New Zealanders man their hospital, the most forward complete hospital unit on the Fifth Army front in Italy. It is a little more than an hour's run from the front line, so that there is quick reception of wounded and sick persons from field ambulance and clearing stations. Less than a month before its establishment this New Zealand hospital was operating in the Middle East. For a short time the staff, with their equipment, were quartered on the east coast of Italy, but within a week of receiving orders to move they were again functioning as a hospital close up the Cassino front. The buildings occupied were formerly Fascist barracks and later a German military hospital. The buildings are modern, divided into bays, conveniently placed for division into wards. The walls are adorned with Fascist slogans which give the patients real entertainment: the highlight selected by the patients is this—"Battle is to men what maternity is to women."

Oiling Blankets

Messrs. OLINOL LTD. (44, King Street, Manchester, 2) write: To obviate any possible further misunderstanding regarding "Olinol No. 1" (the product mentioned in the answer to the question "Oiling Blankets" in your *Journal* of April 15, p. 545) we would respectfully point out that we, and not our friends the Manchester Oil Refinery Ltd., are the originators, manufacturers, and sole distributors of "Olinol No. 1." Misunderstanding has in fact arisen in that several inquirers have written to the Manchester Oil Refinery as manufacturers of the product.

Sycosis Barbae

Col. S. G. S. HAUGHTON, I.M.S. (ret.) (Ely), writes: With reference to the question and answer in the *Journal* of April 8 (p. 511), in the majority of cases of sycosis barbae removal of the infected hairs, neither by forceps nor by *x* rays, is really necessary. A much simpler, quicker, and more satisfactory treatment is to paint the infected area twice a day with liq. ferri perchlor. fortis. Most cases are cured in one week; a few hairs may require extraction, but only a few. The patient after one week has merely to examine his face carefully each day and dab on the liq. ferri perchlor. fort. to any suspicious area. While under treatment no shaving is permitted. This treatment is slightly painful, but that is a minor detail compared with the quick result that is obtained. This treatment was referred to by Lieut.-Col. J. H. Smith, I.M.S. (ret.), a few years ago in the *Journal*. I have used liq. ferri perchlor. fort. in impetigo and sycosis barbae for years, and since using it have not had to try any other, as the result has always been both quick and satisfactory.

The Women's Parliament

The London Women's Parliament is an exuberant body. Over 700 delegates from factories, trade union branches, women's organizations, and professional and municipal bodies, and said to represent half a million London women, meet for occasional sessions. The report of the fourth session held recently has been published by the Women's Parliament (24, High Holborn, W.C.1) as a 4d. pamphlet entitled *Health and Housing*. The record lacks the restraint of Hansard, and the British Parliament would be greatly affronted if the members took their places to the clicking of cameras and the whir of sound track recorders, but at least the women got things done. A Health Bill was passed unanimously in a morning session. This Bill, among other provisions, called for an extension of the Factory Acts in order to establish minimum standards of health and welfare for women and young persons employed on transport and in every form of industry, with a part-time doctor in every enterprise employing 250 people or over, and a whole-time doctor wherever 3,000 or over are employed, also more maternity provision by local authorities, evening sessions at out-patient departments, and the development of real health education, all to be considered as steps towards the establishment of a comprehensive health service. Not content with passing a radical health measure in the morning, the Women's Parliament passed an equally radical housing measure in the afternoon.